BRITISH STANDARD

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Fire precautions in the design, construction and use of buildings —

Part 12: Managing fire safety

ICS 13.220.01; 91.040.01

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee FSH/14, Fire precautions in buildings, upon which the following bodies were represented:

Association of British Fire Trades
Association of British Theatre Technicians
Association of Building Engineers
Association of Corporate Approved Inspectors
Association of Specialist Fire Protection
British Cables Association
British Standards Society
Chief and Assistant Chief Fire Officers Association
Consumer Policy Committee of BSI
Department for Education and Skills
Department of the Environment for Northern Ireland
Department of Health — NHS Estates
District Surveyors Association
Door and Shutter Manufacturers' Association
Fire Brigades Union
Fire Safety Development Group
Guild of Architectural Ironmongers
Health and Safety Executive
Heating and Ventilating Contractors' Association
Institution of Fire Engineers
Institute of Structural Engineers
Line of Fire
London Fire and Emergency Planning Authority
Ministry of Defence — UK Defence Standardization
National House Building Council
Nuclear Industry
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Royal Institute of British Architects
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Contents

Foreword

This part of BS 5588 has been prepared by Technical Committee FSH/14.

This part of BS 5588 is concerned with the management of fire safety, and provides guidance for building designers and fire safety managers (in smaller premises, the fire safety manager is likely to be the owner of the building). Clauses **4**, **5** and **6** deal with general issues and are of relevance to both building designers and fire safety managers. Clause **7** deals with design issues and is mostly of relevance to building designers. Clause **8** deals with the period prior to occupation of a building and is mostly of relevance to building designers, although it is also of some relevance to fire safety managers. Clauses **9** to **16** deal with management issues following occupation of a building and are mostly of relevance to fire safety managers.

This part of BS 5588 covers premises of all sizes and complexity and in consequence some material is only applicable to certain sizes or types of premises.

Users of this part of BS 5588 should use only those clauses applicable to the premises to which they are dealing, e.g. in respect of existing small business premises, provisions in Clauses **11**, **12**, **13** and **14** need to be tailored to the actual risks and situation present.

As a code of practice, this part of BS 5588 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.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

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

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 82, an inside back cover and a back cover.

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Introduction

Managing fire safety is the whole process throughout the life of a building, starting with the initial design, which is intended both to minimize the incidence of fire and to ensure that, when a fire does occur, appropriate fire safety systems (including active, passive, and procedural systems) are in place and are fully functional. The management of fire safety is thus an essential element in averting disaster in the event of a fire. Although many buildings will never have a serious life-threatening fire, it is essential for fire safety procedures to be planned for every building.

Often, the one common element in multi-fatality fires is that, when fire is discovered or when the alarm is raised, the occupants of premises, be they staff or members of the public, react and respond in ways which are different from those assumed or expected by the building designer. There are a number of stages by which people react to a fire alarm. Initially they tend to seek information regarding the validity of the warning, possibly by asking colleagues. They then gather belongings or seek associates or family. Only then do they seek to travel to a place of safety. The management of fire safety is intended to accelerate these different stages to minimize the threat from the fire.

There have been numerous fire incidents, both large and small, where there have been lives lost or put at risk as a result of the safety systems provided being inappropriate or not being used effectively. In some occupancies (such as football grounds), fire is not always seen as the biggest safety problem and care is needed to avoid it becoming a neglected issue.

It is now widely acknowledged that the design and engineering put into a building for life safety can only do its job properly if it can be managed, maintained and tested over the whole life of the building, and if the staff are trained to handle incidents and operate effective and tested emergency plans.

Once the designer or engineer has handed over the building, then good management of fire safety becomes the key element to fire safety for the life of the building.

Effective management of fire safety can contribute to the protection of the building occupants in many ways:

— by working to prevent fires occurring in the first place;

— by being aware of the types of people in the building and any special risks or needs (such as disabled people);

— by ensuring that all of the fire safety measures in the building are kept in working order, and in particular that the means of escape are always available;

— by training staff and organizing the evacuation plan, to ensure that occupants leave quickly if a fire occurs;

— by taking command in the event of a fire until the fire service arrives.

These tasks differ in detail depending on the occupancy of the building.

1 Scope

This part of BS 5588 gives recommendations for the management of fire safety over the lifetime of a building, including guidance for designers to ensure that the overall design of a building assists and enhances the management of fire safety. It also provides guidance on fire equipment and fire safety manuals.

This part of BS 5588 provides generic guidance on the provision of fire precautions and facilities within a building. It addresses the issues that need to be considered during the design process as well as those that will apply whilst the building is in use or which need to be taken into account when alterations to the building or the use of it are being considered.

This part of BS 5588 is intended for use mainly by building designers and fire safety managers or their delegated representatives. It is also intended for use by building owners, who are likely to assume the role of fire safety manager in smaller premises.

This part of BS 5588 is not applicable to buildings under construction (i.e. new build prior to partial occupation).

2 Normative references

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

BS 1635, *Recommendations for graphic symbols and abbreviations for fire protection drawings.*

BS 5266-1, *Emergency lighting — Part 1: Code of practice for the emergency lighting of premises other than cinemas and certain other specified premises used for entertainment.*

BS 5306-0, *Fire extinguishing installations and equipment on premises — Part 0: Guide for the selection of installed systems and other fire equipment.*

BS 5306-1, *Fire extinguishing installations and equipment on premises — Part 1: Hydrant systems, hose reels and foam inlets.*

BS 5306-2, *Fire extinguishing installations and equipment on premises — Part 2: Specification for sprinkler systems.*

BS 5306-3, *Fire extinguishing installations and equipment on premises — Part 3: Code of practice for the inspection and maintenance of portable fire extinguishers.*

BS 5306-4, *Fire extinguishing installations and equipment on premises — Part 4: Specification for carbon dioxide systems.*

BS 5306-5 (all sections), *Code of practice for fire extinguishing installations and equipment on premises — Part 5: Halon systems.*

BS 5306-6 (all sections), *Fire extinguishing installations and equipment on premises — Part 6: Foam systems.*

BS 5306-8, *Fire extinguishing installations and equipment on premises — Part 8: Selection and installation of portable fire extinguishers — Code of practice.*

BS 5499 (all parts), *Graphical symbols and signs — Safety signs, including fire safety signs.*

BS 5588-4, *Fire precautions in the design, construction and use of buildings — Part 4: Code of practice for smoke control using pressure differentials.*

BS 5839-1, *Fire detection and fire alarm systems for buildings — Part 1: Code of practice for system design, installation, commissioning and maintenance.*

BS 5839-3, *Fire detection and alarm systems for buildings — Part 3: Specification for automatic release mechanisms for certain fire protection equipment.*

BS 5867-2:1980, *Specification for fabrics for curtains and drapes — Part 2: Flammability requirements.*

BS 6263-2, *Care and maintenance of floor surfaces — Part 2: Code of practice for resilient sheet and tile flooring.*

BS 6651, *Code of practice for protection of structures against lightning.*

BS 7036 (all parts), *Code of practice for safety at powered doors for pedestrian use.*

BS 7176, *Specification for resistance to ignition of upholstered furniture for non-domestic seating by testing composites.*

BS 7346-2, *Components for smoke and heat control systems — Part 2: Specification for powered smoke and heat exhaust ventilators.*

BS 7346-3, *Components for smoke and heat control systems — Part 3: Specification for smoke curtains.*

BS 8214, *Code of practice for fire door assemblies with non-metallic leaves.*

BS EN 81-72, *Safety rules for the construction and installation of lifts — Part 72: Particular applications for passenger and goods passenger lifts — Firefighters lifts.*

BS EN 671 (all parts), *Fixed fire fighting systems — Hose systems.*

BS EN 1155, *Building hardware — Electrically powered hold-open devices for swing doors — Requirements and test methods.*

BS EN 12101-2, *Smoke and heat control systems — Part 2: Specification for natural smoke and heat exhaust ventilators.*

BS EN 12416-2, *Fixed firefighting systems — Powder systems — Part 2: Design, construction and maintenance.*

BS EN 12845, *Fixed firefighting systems — Automatic sprinkler systems — Design, installation and maintenance.*

BS ISO 14520 (all parts), *Gaseous fire-extinguishing systems — Physical properties and system design.*

3 Terms and definitions

For the purposes of this part of BS 5588 the following definitions apply.

3.1
access panel
panel used to gain access to service ducts and shafts

NOTE An access panel might or might not be fire-resistant.

3.2
canopy
horizontal structure projecting into a void

NOTE An example is the soffit of an upper level walkway, which is not fully stepped back from the level below.

3.3
cavity barrier
construction provided to close a concealed space against penetration of smoke or flame, or provided to restrict the movement of smoke or flame within such a space

3.4
competent person
person, suitably trained and qualified by knowledge and practical experience, and provided with the necessary instructions, to enable the required task(s) to be carried out correctly

3.5 dampers

3.5.1
fire damper
mechanical device that is operated automatically or manually and is designed to prevent the passage of fire and which, together with its frame, is capable of meeting for a stated period of time the fire resistance criterion for integrity

3.5.2
fire/smoke damper
combined fire damper and smoke damper

NOTE See also "fire damper" and "smoke damper".

3.5.3
smoke damper
mechanical device which, when closed, restricts smoke passing through an aperture within a duct or structure

NOTE The device may be open or closed in its normal position and may be automatically or manually operated.

3.6
ductwork
system of enclosures of any cross-sectional shape specifically for the distribution or extraction of air and/or smoke

3.7
emergency action
action to be taken in the event of a fire or other emergency

3.8
escape route
route forming part of the means of escape from any point in a building to a final exit

3.9
final exit
termination of an escape route from a building giving direct access to a street, passageway, walkway or open space, and sited to enable the rapid dispersal of persons from the vicinity of a building so that they are no longer in danger from fire and/or smoke

3.10
fire compartment
building or part of a building, comprising one or more rooms, spaces or storeys, constructed to prevent the spread of fire to or from another part of the same building or an adjoining building

3.11 fire doors

3.11.1
fire door
door or shutter provided for the passage of persons, air or objects which, together with its frame and furniture as installed in a building, is intended (when closed) to resist the passage of fire and/or gaseous products of combustion, and is capable of meeting specified performance criteria to those ends

NOTE A fire door may have one or more leaves, and the term includes a cover or other form of protection to an opening in a fire-resisting wall or floor or in a structure surrounding a protected shaft.

3.11.2
self-closing fire door
fire door fitted with a device which fully closes the door from any angle, overriding the resistance of any latch and/or seal but not including rising butts

3.12
fire-fighting lift
lift with fire protection measures, including controls that enable it to be used under the direct control of the fire service in fighting a fire

3.13
fire-fighting lobby
protected lobby provided within a fire-fighting shaft giving access from a fire-fighting stair to an accommodation area, and normally to any associated fire-fighting lift and fire main

3.14
fire-fighting shaft
protected enclosure containing a fire-fighting stair, fire-fighting lobbies, a fire main and, if provided, a fire-fighting lift together with any machinery space

3.15
fire-fighting stair
protected stairway communicating with an accommodation area only through a fire-fighting lobby

3.16
fire load
quantity of heat which would be released by the combustion of all the combustible materials in a volume, including the facings of all bounding surfaces

NOTE The fire load is expressed in joules.

3.17
fire main
water supply pipe, fitted with an outlet and control valve at specified points, installed in a building for fire-fighting purposes

3.18
fire protection measure
passive or active measure taken within a building to increase the level of protection to the occupants

3.19
fire resistance
ability of a component or construction of a building to meet for a stated period of time the requirements specified in a fire resistance standard, e.g. BS 476 or equivalent European standard

NOTE These requirements can include stability and/or integrity and/or thermal insulation and/or expected duty.

3.20
fire safety engineer
person qualified and experienced in fire safety engineering

3.21
fire safety manager
nominated person carrying out the job of management of fire safety

3.22
fire safety manual
record of all design, procedural and management issues and events that relate to the fire safety of a building

3.23
fire service access level
level at which there is suitable entry to a building and to a fire-fighting shaft from an area to which fire service appliances have access

3.24
fire stopping
sealing or closing an imperfection of fit between elements, components or construction of a building, or any joint, so as to restrict penetration of smoke and flame through the imperfection or joint

3.25
first-aid fire-fighting equipment
equipment for use by the occupants of a building to fight a fire

NOTE These include hose reels and portable fire extinguishers.

3.26
floor area
area enclosed by the inner surfaces of a wall, including internal walls

3.27
integrity
ability of a separating element when exposed to fire on one side, to prevent the passage of flames and hot gases or the occurrence of flames on the unexposed side, for a stated period of time in a standard fire resistance test

NOTE This may be expressed as integrity criterion "E" (see BS EN ISO 13943).

3.28
lift landing
floor space from which a lift car is normally entered at each level

3.29
management of fire safety
task(s) carried out by a defined individual or individuals with appropriate powers and resources to ensure that the fire safety systems, passive, active and procedural, within the building are working properly at all times

3.30
means of escape
structural means whereby a safe route or routes (in the event of fire) is or are provided for persons to travel from any point in a building to a place of safety

3.31
phased evacuation
process where a limited number of floors are evacuated at the same time

NOTE This is usually the floor containing the fire and the floor above. The remaining floors are evacuated at later stages if required.

3.32
place of safety
place in which persons are in no immediate danger from the effects of a fire

3.33
pressure differential system
system of fans, ducts and vents provided for the purpose of creating a pressure differential between a fire zone and a protected space

3.34
pressurization
method of smoke control using pressure differentials, where the air pressure in the spaces being protected is raised above that in the fire zone

3.35
protected
enclosed (other than any part which is an external wall of a building) with fire-resisting construction

3.36
protected lobby/corridor
circulation area consisting of a lobby or corridor enclosed with fire-resisting construction (other than any part that is an external wall of a building)

3.37
protected shaft
stairway, lift, escalator, chute, duct or other shaft of fire-resisting construction which enables persons, objects or air to pass from one fire compartment to another

3.38
protected stairway
stair, that is protected from fire elsewhere in the building by fire-resisting construction (including any exit passageway between the foot of the stair and the final exit), discharging through the final exit to a place of safety

3.39
purpose group
classification of a building according to the purpose to which it is intended to be put

3.40
refuge
area that is both separated from a fire by fire-resisting construction and provided with a safe route to a storey exit, thus constituting a temporarily safe space for disabled people to await assistance for their evacuation

3.41
sprinkler
temperature-sensitive sealing device which opens to discharge water for fire extinguishing

3.42
sprinkler installation
part of a sprinkler system comprising a set of installation main control valves, the associated downstream pipes and sprinklers

3.43 sprinkler systems

3.43.1
high-rise sprinkler system
sprinkler system in which the highest sprinkler is more than 45 m above the lowest sprinkler or the sprinkler pumps, whichever is the lower

3.43.2
life safety sprinkler system
sprinkler system forming an integral part of measures required for the protection of life

3.43.3
sprinkler system
system for providing sprinkler protection in a building, comprising one or more sprinkler installations, the pipe work to the installations, and the water supply or supplies except town mains and bodies of water such as lakes or canals

3.44
structural element
member forming part of the structural frame of a building or any other beam or column

NOTE A structural element can be a load-bearing wall or load-bearing part of a wall; a floor; a gallery; an external wall; or a fire compartment wall (including a wall common to two or more buildings).

3.45
vent
device that is either open or capable of being opened to permit the passage of air or smoke between a part of a building and the external air

NOTE Examples include windows, roof lights, doors, louvres and grilles.

4 General

4.1 Spread of fire

A common basis for designing fire safety measures lies in the identification of the possible sources of outbreak of fire and the evaluation of the manner in which it is likely to develop and spread through the building.

The recommendations and guidance given in this part of BS 5588 are based on the assumption that under normal circumstances (i.e. except in the case of arson) a fire is unlikely to start in two different places in a building.

Initially, a fire creates a hazard only in the part of the building in which it starts and is unlikely to involve a large area, although it can subsequently spread to other parts of the building. Fire is less likely to spread if passages, corridors, lobbies or stairways intended for use only for access or means of escape are kept clear of combustible materials.

It is unlikely that fire will originate in the building structure itself. Outbreak of fire is more likely to occur in furnishings, decorations, finished goods, raw materials and/or chemicals, equipment, process plant or service plant in the building. The point of origin is therefore likely to be in display areas, factory areas, storerooms, kitchens or offices, or possibly in the service installations.

When a fire occurs in an enclosed space, hot smoke-laden gases rise to form a layer, which at first has a tendency to flow under the ceiling and then deepens to fill the whole space. The fire tends to grow in area, the flames spreading to nearby combustible furnishings, fittings, exposed papers, etc. The flames increase in height until they reach the ceiling where they are deflected horizontally and, radiating downwards, accelerate fire growth. If the ceiling is combustible, it can ignite and add to the volume of flame and speed of fire growth. If the space has insufficient openings to provide a continuing air supply, the burning rate of the fire diminishes as it draws on increasingly vitiated products of combustion, but the gases generated are then extremely toxic.

Once ignited, combustible products give off hot smoke-laden and toxic gases. Convection and radiation also occur rapidly and, because of the extremely high temperature of the gases, other combustible materials and products within the area of the fire will ignite more easily, further accelerating the progress of the fire. It cannot be assumed that the effects of the fire will be confined to the space in which it originated. If the enclosing walls have no fire resistance or do not form a fire-tight joint with a fire-resisting floor (or ceiling) above, the fire will soon penetrate at ceiling level, where the attack from the flames or hot gases is most severe, to the adjoining space. Even with fire-resisting construction, the buoyancy and expansion of the fire gases can cause them to be driven out of the space to affect other parts of the building.

If the fire gases penetrate into a vertical shaft, such as a stairwell, lift well or duct, they will rise rapidly, attacking the top of the shaft and spreading elsewhere if there are any openings in the shaft. In such circumstances, if a substantial flow of air reaches the fire through an aperture such as a window or door, the vertical shaft can act as a chimney and can greatly accelerate fire growth.

A fire occurring anywhere within a compartment of a building has, therefore, to be regarded as presenting a hazard to all occupants within that compartment, even though in the initial stages of fire development it might seem that persons are well removed from immediate danger. There is also likely to be a risk to persons in other parts of the building.

In the early stages of a fire, the most significant effects are usually those of smoke and other products of combustion. Smoke is often the first evidence of fire detectable by the occupants and is thus likely to be the first cause of alarm. When smoke extends down to head height it produces difficulty in breathing and impairs visibility, which interferes with the efforts of occupants to find their way towards the exits. People who are prevented from escaping by dense smoke, or who are unduly retarded from escaping by it, can suffer from the toxic effects of the products of combustion that accompany the smoke. The asphyxiating effect caused by lack of oxygen or by the intense heat of the gases making up the smoke can cause intoxication, disorientation, incapacity, unconsciousness and, in the worst scenario, death.

The speed at which a space becomes untenable is mainly dependent on its volume and the fire growth rate. For higher and larger spaces the time taken to fill with smoke takes longer and so there is more time for escape and longer travel distances are possible.

These considerations are particularly important when dealing with large numbers of persons, some of whom might be unfamiliar with their surroundings, and who might also vary widely in age and degree of mobility.

To facilitate escape it is thus necessary:

a) to ensure that protected escape routes are provided and that they are adequately safeguarded against the ingress of smoke;

b) to limit the time people have to travel before they reach a protected route and/or a final exit;

c) to consider reverse flows that might occur as a result of a particular exit route being unavailable or as a feature of an evacuation plan for disabled people.

A means of smoke ventilation might be necessary to assist the fire service and, if operated automatically, can also assist escape from the building.

After the outbreak of fire there might only be a short time during which the actions necessary for ensuring the safety of occupants can be carried out. This time will be sufficient only if all provisions for the safety from fire of people, property, business viability and the environment are planned and managed so as to be effective when the occasion arises.

4.2 Management considerations

The guidance given in this part of BS 5588 is primarily concerned with the life safety of persons in and around buildings, but it also takes account of the need to protect property and the environment, and to minimize business disruption, throughout the entire life cycle of the building, addressing such issues as:

— effective management planning and control;

— protection of escape routes from any area that could be threatened by fire (see in particular **7.4.3** and **11.2**);

— fire resistance in the building structure, surface finishings, carpets and furnishings (see **7.3.2**);

— segregation of high fire risk/hazard areas;

— fire warning systems and, where appropriate, systems for the automatic detection of fire;

— automatic fire extinguishing systems to limit the growth of fire;

— smoke control measures to maintain the effectiveness of escape routes and to assist fire-fighters (see **8.1**);

— fire-fighting equipment, whether for use by the staff in containing fire in its early stages, or by way of assistance to the fire service (see in particular **7.4.6** and **11.3**);

— reasonable access to the building for the fire service, including facilities for the safe and rapid extinction of fire by the fire service and for the safety of the fire service personnel when fire-fighting (see **7.4.5**).

The recommendations given in this part of BS 5588 are general, and all fire safety protection measures, procedures etc. should take into account the particular circumstances of the individual building or complex concerned. The same recommendations generally apply to both existing and new buildings, but existing buildings often pose problems which are unlikely to arise in new buildings. In assessing the fire safety management needs of an existing building which is being modified, it is essential to have a full understanding of the existing structure and any fire safety provisions incorporated, and to take into account all of the following:

a) any change in use of the premises which could increase or decrease fire safety levels (e.g. increased fire load and process risks, introducing the public, changes to sleeping risk);

b) how the necessary fire safety levels can be practicably achieved in the existing premises and whether they are appropriate;

c) historic and environmental aspects of the premises and to what extent they need to be disturbed;

d) legislation and guidance introduced since the premises were originally constructed, or last altered, or since their fire safety was last assessed;

e) the interrelationship between life safety and property/contents.

Historic buildings present particular challenges, as many are “listed”, and permitted alterations are limited, without the agreement of the appropriate authorities. The advice of consultative bodies, such as English Heritage, should be sought in the early stages of design. The appropriate authorities sometimes agree to limited modifications to improve life safety where, in turn, there will be added long-term protection and preservation of the original building fabric. Specific issues relating to historic buildings can be divided into three areas:

1) the preservation of the ambience and important features of the building such as timber linings to accommodation stairs and slender cast iron structure, both of which can sometimes conflict with the desired fire safety construction but can be accommodated with suitable compensating features;

2) the existing construction of the building, including hidden features such as the extent of cavities through which fire could spread and the quality of walls, partitions and floors the fire resistance of which might be unknown or questionable. Life safety can often be addressed by the use of suitable compensating features, but these do not always cover property protection and business interests;

3) the fire performance of the existing structural frame. Modern construction standards can seldom be applied to historic premises, but action to maintain an appropriate level of fire safety might be necessary in the event of a change of use of the building.

5 Developing management levels

5.1 Assessing management levels

There will be times during the life of a building, e.g. changes in the use or occupancy, when the standard or quality of management required to operate the building safely, or that actually operating within the building, needs to be reassessed. The standard or quality of management is referred to here as the management level. The person(s) responsible for fire safety design may either specify the management level that is appropriate for the design of building, or anticipate the management level and then design the safety measures accordingly.

Table 1 may be used to determine the necessary management level for a building, or to assess the existing management level. There are three levels, with level 1 giving the highest standard or quality of management and level 3 the lowest. The list of factors given in the tables is not exhaustive, but gives guidance on some of the issues that need to be taken into account when assessing the management level.

The occupancy level of a building provides a qualitative indication of the issues that can affect the demands that are placed on management by the occupants of that building, and can be used to determine the management level.

Table 1 — Management levels

Management factor	Sub-clause	Management level		
		Level 1	Level 2	Level 3
Ownership	**5.2**	Known	Limited	Not known
Manager's role	**5.3**	Single responsible person	Known responsible persons	Not known
Resources/authority	**5.4**	Good	Average	Minimal/none
Staffing level (staff-occupant ratio)	**5.5**	High	Medium	Low/none
Fire training	**5.6**	Good	Average	Minimal/not known
Security	**5.7**	Good	Medium	Minimal
Work control (e.g. repairs to structure)	**5.8**	Good	Average	Minimal/none
Communications procedures	**5.9**	Good	Average	Minimal
Maintenance/testing of fire safety systems	**5.10**	Frequent	Occasional	Minimal
Liaison with the fire service	**5.11**	Good	Average	Minimal
Contingency planning	**5.12**	Good	Adequate	None
Degraded systems planning	**5.13**	Good	Adequate	None
Abnormal occupancy planning	**5.14**	Good	Adequate	None
Testing/auditing of management system	**5.15**	Fully independent	In-house	Minimal/none
Risk management	**5.16**	Good	Poor	None
Fire load management (contents control)	**5.17**	Good	Poor	None

When determining the management level:

a) to achieve level 1, all components should lie in level 1, or a strong case should be made with the reasoning and implications stated in the fire safety manual;

b) to achieve level 2, all components should lie in levels 1 or 2, or a strong case should be made with the reasoning and implications stated in the fire safety manual;

c) if the ownership of the property is not known, or uncontrolled change of use is possible, then level 3 should be assumed throughout.

In some buildings the physical design of the building, or the provision (or lack) of specific fire protection measures, can also have an impact on determining the management level.

Each management factor (see Table 1) should be assessed in relation to the occupancy level (see Table 2) to which it is being applied. Whilst some indication is given here to guide any assessment, it does, however, follow that such assessments will be largely subjective, and dependant upon the nature of the particular occupancy being assessed.

Once the appropriate management level has been determined it should be adopted as a requirement and specified in the fire safety manual (see Clause **6** and Annex A).

The management system can be changed to a higher level (lower number) without significantly changing either the fire safety management system or the fire engineering, but not to a lower level (higher number). Changes to a lower level may only be made if the fire safety management system is upgraded or the fire safety engineering system is upgraded.

NOTE This imposes limitations on future occupants of the building.

Table 2 — Occupancy levels

Occupancy factor	Occupancy level		
	← Low[a]	Intermediate[a]	High[a] →
People factors			
Occupancy density	Light occupancy	Medium occupancy	High occupancy/not known
Layout knowledge of occupants	All familiar	Some familiar	Few familiar
Reaction times	Fast reaction	Average reaction	Slow reaction (including sleeping)
Disabled people	Few disabled	Some disabled	Many disabled
Occupant profile	Young healthy	Mixed adult	Elderly/children
Use factors			
Risk	Low risk	Medium risk	High risk/not known
Fire load	Low fire load	Medium fire load	High fire load/not known

[a] The occupancy levels represent a continuum; moving towards a low occupancy level will not degrade the safety criteria set by the management level, but moving towards a high occupancy level will.

5.2 Ownership

If the fire safety systems provided in the building are dependant upon a specified level of management, the crucial factor is knowledge of the ownership of the building, since this factor influences all of the others. Some buildings are so limited in the options for their use that the ownership of the building may be assumed for the lifetime of the building. Other buildings are such that they may be expected to change hands many times in their working lifetime, in a random fashion. Others may be expected to change hands, but within a very limited set of owners. Where the ownership of a building is known, the management of the building can be defined, identified, and made readily aware of the management implications in the fire safety design.

5.3 Manager's role

Management responsibilities can reside with a single defined individual or be distributed amongst a number of managers or staff. The management of fire safety is best carried out where a single individual has single, or overall, responsibility, so that there is little or no risk of issues becoming neglected through communication problems. The standard of management of fire safety is likely to be poor if the manager's role is undefined or not known.

5.4 Resources and authority

For the management of fire safety to be effective, the fire safety manager needs to be empowered and to command sufficient resources to maintain the systems. The manager or managers with responsibility for fire safety need to be empowered to enforce requirements, initiate testing, maintenance or repair, and, where necessary, command staff. Such powers need to be supported by the necessary, sufficient and appropriate resources (funds). Managers who have no power and no resources are unlikely to be able to ensure that the fire safety systems are kept fully functional. Managers with limited resources might be able to maintain a minimal or average standard of fire safety.

5.5 Staffing level (staff-occupant ratio)

The appropriate staffing level for a particular building is defined by the use of the building and the types of occupant. For example, a staffing level of one staff member to fifty occupants might be considered "high" for a retail outlet, but only "medium" for a hotel. In addition to catering adequately for the occupants, a high staffing level is one that includes provision for contingencies, sickness or holiday absences. A medium level is one that provides adequate staffing normally, but has no contingency provision. A low staffing level is one that might not be sufficient to communicate with occupants or assist occupants out of the building effectively in an emergency.

5.6 Fire training

A good level of training is one that ensures that there are sufficient numbers of staff trained in all aspects of fire prevention, fire protection and evacuation procedures and able to use the appropriate extinguishing equipment (and media) so as to provide full coverage of the building, with provision for contingencies, sickness or holiday absences. An average level is one that provides coverage of high-risk parts of the building, but has no contingency provision. A minimal level is one that is unlikely to provide cover for most anticipated events.

5.7 Security

Security arrangements influence the risk of arson, but also need to ensure that means of escape remain unobstructed. A good level of security might include regular patrols, perimeter controls, entry control systems, and staff able to respond to an intrusion. A medium level might include just one of these. A minimal level is one that does not offer adequate barriers to potential arsonists.

5.8 Work control

Management systems should be able to control work on site, e.g. repairs to structure, and in particular hot work. A good work control system is one that has clear lines of responsibility, a permit system, with logging and audit, routine checking and supervision. An average system might have a loose recording system with some supervision. A minimal system is one that is inadequate to minimize damage to the fire protection systems or fires as a result of hot work.

5.9 Communications procedures

Communications procedures include means of being alerted to a fire, communications between management, between management and staff, messages to occupants and communications with the fire service in the event of a fire. Good communications procedures are able to ensure that all of those involved in an incident are informed rapidly and effectively, with contingency plans when systems fail. Average level procedures might notify some of those involved, but less reliably. A minimal procedure is one that cannot be relied upon in an emergency.

5.10 Maintenance and testing of fire safety systems

Robust inspection, maintenance and testing schedules and procedures should be in place. A frequent level is one where the equipment is kept fully functional for all the times the building is in use or where alternative procedures are put in place to cover for down-time. An occasional level will include long intervals between inspections and delays in repair.

5.11 Liaison with the fire service

A good relationship with the fire service ensures that expert advice and help is available and that a pre-planned response strategy is in place. Good liaison includes routine meetings with the fire service and always where there has been a significant change in the building or its occupancy. The fire service is likely to have fully developed strategies for most conceivable events. Average liaison allows the fire service to develop general response strategies, but these might not be fully up to date on the day. Minimal liaison means that the fire service has to determine tactics at the incident.

5.12 Contingency planning

Contingency plans need to include preparation and response to a wide range of unusual events. Good planning includes consideration of a wide range of possible emergencies and incidents, shelter, communications, transport, weather, time of day, time of week, time of year (holidays etc.), traffic-related issues, etc., as well as problems such as power failures or floods. Adequate or poor planning might only include a selection of these.

5.13 Degraded systems planning

Management systems should include provisions and alternative procedures for occasions when safety systems break down or are under repair or maintenance. A good system is one that includes plans to provide alternative protection measures when any part of the safety system is unavailable. This includes planned maintenance as well as unforeseen failures, e.g. if the detection system is inoperative then additional fire marshals/fire wardens are provided, or part of the building is taken out of use. An adequate or poor system might only address some parts of the safety system.

5.14 Abnormal occupancy planning

Management systems should include procedures for abnormal occupancy loads, e.g. at Christmas, during sales, or unusual or rare events. Good planning takes account of situations where the occupancy density could seriously affect evacuation plans, e.g. Christmas sales or food shortage scares for retail premises, and special one-off events involving celebrities or jubilee-type occasions for public buildings. Adequate or poor planning might only go a little way to addressing such unusual situations.

5.15 Testing and auditing of management system

A testing and auditing procedure should be in place, with procedures to respond to and correct failures. Testing/auditing programmes that involve fully independent assessors inspecting the systems regularly are most likely to ensure a high standard of fire safety. In-house audits are likely to be far more variable.

5.16 Risk management

Where an occupancy entails special or unusual risks, e.g. the introduction into the building of energy-dissipating machinery or a change in occupancy type from English speakers to non-English speakers, special procedures are needed. A good level of risk management is one where procedures are in place to identify, monitor and record these risks and to ensure that the safety procedures and systems are appropriate. A poor level of risk management is one where the monitoring of special risks is haphazard. Of particular concern are premises where unusual and special risks might be introduced only rarely and where there is little awareness of the need to react.

5.17 Fire load management (contents control)

Management systems should include procedures and authority to limit and control the introduction of combustible materials of any type into an occupancy. A good level is one where procedures are in place to identify, monitor and record the combustible contents of the building. A poor level is one where the monitoring of combustible materials is rare. Of particular concern are premises where unusually high fire loads might be introduced only on occasions and where there is little awareness of this.

6 Fire safety manual

The design of buildings needs to be documented for the benefit of the management of the premises. All relevant information should be included in a fire safety manual. The manual needs to set out the basis on which the fire safety design was planned, the type of management organization envisaged for running the building, and the consequential staff responsibilities. It needs to explain the operation of all the mechanical and electrical systems and to give information on routine testing and maintenance requirements.

The assumptions made at the design stage regarding these aspects should be recorded in the fire safety manual.

For those premises which require a risk assessment to be carried out, the fire safety manual should form part of the information package that contributes to the risk assessment.

The fire safety manual, its contents, use and upkeep should conform to the recommendations given in Annex A.

7 Designing so that a building can be managed

7.1 General

The key management issues relating to a new project should be identified at the earliest possible stage (preferably at the concept stage) and should be taken into account when designing the building. Liaison with other agencies, e.g. building control bodies, fire prevention officers, health and safety inspectors and insurance bodies, should be initiated as early as possible.

Although the formal responsibilities of the designer and the fire safety engineer largely end once the building is completed and occupation and/or use has commenced, many, if not all, of the systems included will entail management assumptions. Some of these will be implicit, e.g. the assumption that structural fire protection remains in place, or the assumption that the fire load within the building does not exceed certain assumed limits, but many others will be explicit, in particular with regard to maintenance and testing of active systems.

By careful and considered design or location, the designer or fire engineer can provide the building with facilities and equipment which can assist fire safety managers in carrying out their duties in preventing the occurrence of fire.

The day-to-day activity of the fire safety manager is made more difficult if the fire safety design conflicts with the "normal", everyday, use of the building, e.g. by placing fire doors across through-routes, or if it fails to take account of "real" behaviour during an incident, such as counter-flows in escape routes as parents search for children.

In practice, the designer or fire safety engineer can assist the work of the fire safety manager by ensuring that:

a) active fire safety systems are able to be properly maintained and tested;

b) passive fire safety systems are not likely to be made ineffective, e.g. during repair work to or penetrations of fire-resisting walls, or by blocking of escape routes;

c) the building design accurately reflects the anticipated use, fire loading and management of the building, e.g. by making appropriate provisions for disabled people;

NOTE The recommendations given in Clause **7** are based on the assumption that the building is being designed to meet a specific occupancy with a defined management system. However, if greater flexibility is required in the future use of the building, the designer might need to provide for greater levels of safety, and to reduce management issues as far as possible. If the systems provided for fire safety, e.g. sprinkler systems and storage systems, are specified for a defined level of risk, this can determine the management requirements in the building.

d) suitable facilities and equipment are provided to prevent fires from occurring, including suitable housekeeping measures and security measures (see **7.3.2** and **7.3.4**);

e) suitable facilities and equipment are provided for use in the event of a fire, to contain the fire as far as possible and to enable effective evacuation;

f) contingency planning is taken into account at the design stage.

Designers should familiarize themselves with the responsibilities and tasks of the fire safety manager so that these can be taken into account in the design.

7.2 Management input

Designers need to take account of human behaviour, in particular in emergency situations, rather than design a complex system which requires a rapid learning process by the occupants at a time of stress. There is therefore a need for the fire safety systems to be appropriate for what people actually do, not what the designer would like them to do.

Fire safety systems should be considered as an inherent part of the basic design, and not as supplementary to other matters such as services or finishes. Where there are conflicts of interest, compromises can be necessary. In any case, a flexible approach is essential if novel problems are to be solved. There can be conflicts between the fire safety requirements and the normal use of the building or with building services or with other safety systems, e.g. a door to restrict the movement of fire or smoke will also restrict the movement of people. There can also be confusion between a fire door, which needs to be kept shut, and a fire exit door, which may be kept open. These conflicts can, however, normally be overcome as there is no purpose in putting in place fire safety measures which do not allow the normal use of the building or will be negated by such normal use.

A clear statement of the design requirements for the management of the complex has to be obtained from the client and conveyed to the design team: architect, designer (and fire safety engineer).

NOTE A design that does not fulfil the management brief can adversely affect the safety of the complex. It can also adversely affect running costs, staffing levels and general efficiency, and can sometimes lead to extensive modifications to cater for conditions that were not anticipated by the designers.

Good management at the design stage is necessary to ensure that full benefit is taken of the experience of specialists in relevant areas. All parties involved in the design of a building should cooperate to ensure that fire safety systems are compatible and that if any changes are made, the consequential effects can be accommodated. In particular:

a) the owner/developer should give the design team a comprehensive brief on the requirements for management of the building. If it is to be a multi-occupancy complex then this brief should include the management requirements for the components;

b) those responsible for the future management of the building should, as far as possible, form part of the design team. They should monitor the development of the design concept and the detail of the systems they will eventually have to use and maintain. When construction is under way, they should have access to the site so that they can inspect and understand the various fire safety systems, some of which will not be visible when installation is complete;

c) the principles and details of all life safety systems should be fully discussed and agreed with the regulatory authorities and all affected specialists in the design team.

Where a project is speculative, without a particular occupier in mind, or even a particular use, then it can be appropriate to design with minimal management requirements.

Other aspects to consider are the management of environmental issues, e.g. water run-off, and the long-term implications of the proposed design for management over the life of the building.

7.3 Designing for the management of fire prevention

7.3.1 *General*

By careful and considered design or location, the designer can provide the building with facilities and equipment which can assist the fire safety manager in carrying out their duties in preventing fire occurring.

Recommendations for provisions to assist with good housekeeping, building maintenance and security are given in **7.3.2**, **7.3.3** and **7.3.4**. The general recommendations given in **7.3.5** are also applicable.

7.3.2 *Housekeeping*

Good housekeeping is essential to reduce the chances of fire starting or developing, and escape routes being blocked. The designer should provide means for as many of the following items as necessary:

— keeping combustible materials separate from possible ignition sources;
— safe storage of flammable liquids, paints and polishes in appropriate containers;
— safe storage of other hazardous items, e.g. LPG cylinders, aerosol cans;
— ensuring that escape routes can readily be kept clear;
— ensuring that fire doors can readily be kept closed;
— waste control and waste disposal;
— carrying out catering and cooking in appropriately designed and protected facilities;
— protection for essential hot work or heat-dissipating processes.

In addition:

a) buildings should be designed and laid out in such a way that all escape routes can be maintained free from obstruction;

b) adequate provision should be made for enclosed and/or secure storage areas within the building;

c) storage should be provided so that goods, materials, unwanted furniture, etc. need not be stored within escape routes;

d) seating areas should not be provided within escape routes;

e) surface finishes and coverings (including carpets) on walls, ceilings and floors within escape routes should be such that maintenance would not require the use of materials that might propagate surface spread of flame and/or fire, or adversely affect the means of preventing such propagation;

f) floor surfaces within escape routes should be maintainable, even and slip-resistant;

g) provision should be made for refuse, waste paper, etc. to be stored separately pending its removal from the premises, so that it does not accumulate on the premises. Wherever possible, it should be possible for all combustible waste to be baled and removed from the premises daily;

h) means should be provided of restricting goods in store rooms so that they are not stacked close to windows, and if there is a sprinkler and/or detection system, that they are stacked not higher than the height recommended in BS 5306-2, BS EN 12845 and BS 5839-1;

i) where it is expected that large fixtures will be introduced into the building (e.g. shop fittings, linings, special displays), the provision for their siting should be such that exits can be kept clear and unobstructed, and exit signs will be visible from the relevant parts of the premises.

7.3.3 *Equipment and fittings maintenance*

A significant way of preventing fire incidents is to maintain equipment and fittings that might start a fire and to control materials that might allow a fire to develop and spread. The designer should provide means for the fire safety manager to inspect and maintain as many of the following items as necessary:

— potential sources of ignition such as gas, oil and electrical heating installations;

— other electrical and gas installations;

— other heat-dissipating equipment (e.g. factory machines, factory processes or office machines);

— floor coverings, furniture, furnishings, décor, scenery, props, curtains and drapes;

— any other equipment that presents a particular fire risk, such as oxygen-handling equipment (e.g. oxygen tents).

7.3.4 *Security*

Good security arrangements can reduce the risk of serious fires by arson. In order to reduce the likelihood of arson, and to mitigate its effects if it does occur, the designer should provide means for as many of the following as are deemed appropriate:

— security against intruders;

— intruder detection;

— means of controlling of ignition sources and easily ignitable materials;

— fire detection;

— fire suppression;

— compartmentation;

— segregation of materials and/or processes that could present a risk;

— limiting the proximity of ancillary buildings and of external storage, particularly of combustibles and waste.

The designer should ensure that security arrangements do not prevent occupants from reaching a place of safety (see **10.5**). Security of the building can be in both directions: ingress and egress. In certain premises, such as homes for people with mental ill health, the need to restrict the occupants from leaving the premises should be integrated with adequate and manageable emergency egress.

The selection of hardware should take account of the types of people using the building.

NOTE Some door security measures, e.g. letter-plates, can compromise the fire performance of the door.

When planning the security arrangements, the designer should take account of the needs of members of the fire service who might need to enter the building to effect rescue or fire-fighting, and those of insurers.

7.3.5 *Other design issues*

A clear space should be provided and maintained around heaters of all types, including convector, tubular and thermal storage heaters. Guards should be provided to prevent the stacking of any combustible materials close to heaters. Similarly, a clear space should be provided around vents of refrigerator compressor motors.

Means of shutting down equipment, stopping machines and processes and isolating power supplies, where appropriate, should be provided.

Special requirements can be imposed by the relevant enforcing authority for areas of high fire risk. Where highly flammable or explosive substances are to be stored or used in excess of prescribed amounts, the area is considered to be of high fire risk and the relevant enforcing authority should be consulted at the earliest possible stage. Similar considerations might be needed for certain storage modes, e.g. high rack, etc.

NOTE If a brief is agreed with the relevant enforcing authority at an early stage as to the intended use of the premises and the materials to be stored or used, this can overcome the need for costly additional fire safety measures to be put in place after the premises are occupied.

7.4 Designing for the management of fire protection

7.4.1 *General*

Fire protection is needed to assist and protect occupants in the process of moving safely away from danger after a fire has started, via notification of systems such as fire alarm systems, passive and/or active fire safety systems.

7.4.2 *Safety systems*

7.4.2.1 *Control systems and control rooms*

The sophistication of the fire alarm system and public address arrangements should be taken into account when establishing which evacuation procedures might be possible in large or complex buildings.

Control systems should be designed such that:

— all background sound systems which do not perform safety functions, including temporary ones, are silenced in the event of fire;

— passenger lifts are brought immediately to the final exit level, and kept there during the fire emergency;

— urgent information is clearly identified and requires minimal response procedures.

Efforts should be made to create systems that avoid information overload, taking into account the fact that in a fire incident, events can be occurring faster than the controller can respond.

Wherever possible, manual control apparatus should be provided outside the building for use by the fire service, or in protected rooms inside the building, close to the entrances to the building.

Recommendations for the management of fire control centres are given in Annex B (see also **12.4**).

NOTE BS 5588-5 gives recommendations for the equipping of fire control centres.

7.4.2.2 *Availability*

Systems are sometimes unavailable because of maintenance, testing, repair, breakdown or impairment. There should be clearly defined limits for the periods when a system is out of commission, and special procedures, including those relating to evacuation, should also be implemented. In some cases it can be necessary to have a duplicate system.

The equipment provided should be such that there is likely to be spare parts, replacement components, or replacement equipment in total, available for the working life of the building.

7.4.2.3 *Reliability, durability and resilience*

The equipment provided should be sufficiently reliable that it is possible to depend on it in an emergency, and should not be prone to false alarms or failures.

NOTE Systems that are prone to false alarms or failures on a regular basis are more likely to be taken out of service by occupants than systems that function correctly. Systems that are prone to false alarms on a regular basis, even if they are retained in service, can make building occupants complacent and therefore unlikely to react to an alarm signal speedily, thus putting occupants at risk in the event of an actual fire occurring.

Similarly, equipment should be provided that is expected to be durable over a reasonable working life, within the relevant environmental and operational conditions, and able to continue working even with some parts temporarily inoperable.

7.4.2.4 *Testability, maintainability and reparability*

The design of the equipment provided should be such that it can be readily and easily tested and maintained, both as an item and as part of a larger system, in such a way as to minimize business interruption. There should be an available source of spare parts for the equipment.

If successful operation of a system depends upon devices in other systems (e.g. smoke control systems and fire detection systems), it should be possible to test the systems as a complete entity as well as individually.

7.4.2.5 *Other factors*

Account should be taken of the usability and ergonomics of fire safety equipment to ensure that it is compatible with the normal use of the building. Equipment provided solely for fire safety can present injury risks (e.g. self-closing fire doors).

The designer should provide for the following where appropriate:

— protection against common mode failures, e.g. with any building management system;

— vandal-proofing and tamper-proofing;

— weather resilience, especially of escape routes (e.g. final exit doors opening into areas prone to snowdrifts) and air-intakes (e.g. for smoke control);

— reliability of water supplies;

— interactions between normal heating, ventilation and air conditioning systems (HVACs) and smoke control systems;

— software-controlled safety systems, means of testing, resilience, failure modes and manual overrides;

— protection of safety-critical software;

— protection of safety-critical electrical and electronic equipment from the risk of damage by discharge of water.

All equipment and systems should be in accordance with the appropriate British Standards.

NOTE Annex C gives examples of fire safety equipment, facilities and systems requiring inspection, maintenance, testing and repair.

7.4.3 ***Fire doors and escape routes***

Buildings should be designed and equipped such that in an emergency the occupants of the building can make their way easily to a place of safety. Designers need to take account of human behaviour, in particular in emergency situations, and seek to use this behaviour to lead people to safety, rather than design a complex system that requires a rapid learning process by the occupants at a time of stress.

For example, people generally prefer to leave a building the same way that they came in, and prefer not to use an unfamiliar route in an emergency. They tend to use stairways with which they are familiar, rather than special dedicated escape routes, so a stairway intended only for use in emergencies would not be recommended. Escape routes should follow the normal circulation within the building as far as is practicable.

Escape routes that consist of stairs, corridors, balconies etc., are generally expected to be safe for the occupants to move to a recognized safe place outdoors. The designer should take into account how the building is to be used and managed, and should design door equipment and provisions along escape routes such that:

a) all doors that need to be unlocked and readily available for use can be made so readily;

b) all emergency fastenings can be checked;

c) any doors, gates or shutters that are required to be locked in the open position can be so locked;

d) all escape routes and escape doors (both internally and externally) can be kept free from obstruction;

e) where practicable, fire doors are in positions where they are not likely to be wedged or propped open. Where this is not practicable, fire doors should be provided with hold-open devices on an automatic release mechanism which can be returned to the closed position when required;

f) where hold-open devices are not provided for a fire door, the door has a warning notice on it reminding people to keep it closed unless it is provided with a hold-open system;

g) any fire door that subdivides a corridor is provided with vision panels;

h) where routes are protected for compartmentation purposes by fire-resisting doors or shutters, these doors or shutters are operated only on local detection of heat;

i) escape routes and escape route signs are adequately illuminated (see **7.4.4**) and, where necessary, two power supplies are provided, e.g. mains and battery;

j) final exit doors open into a place of safety (e.g. not into a roadway or, if so, adequate non-limiting safety barriers are provided). Such exits should be designed to avoid or minimize any risk of obstruction to rapid dispersal of persons from the vicinity of the building;

k) door securing systems using "swipe cards", combination locks or any other electrical or mechanical device are released in an emergency and fail-safe unlocked;

l) any evacuation lifts for disabled people can be kept operative.

7.4.4 *Signs and signage*

Fire safety signs and signing systems form an integral part of the overall fire safety strategy of a building and are fundamental to the communication of good fire safety management information. Clearly visible and unambiguous signage is essential for speedy escape, particularly in buildings where many of the occupants might be unfamiliar with the building layout.

NOTE 1 Attention is drawn to EC Directive 92/58/EEC [1] in respect of the provision of safety signs at work. Attention is also drawn to the Health and Safety (Safety Signs and Signals) Regulations 1996 [2] and to the Health and Safety (Safety Signs and Signals) Regulations (Northern Ireland) 1996 [3], which require employers to provide safety signs where other methods, properly considered, cannot deal satisfactorily with the risks.

NOTE 2 Information on categories of signs and signage is given in Annex D. Guidance on the regulations is given in HSE publication L 64 [4]. Requirements for fire safety signs are also given in BS 5499.

All fire safety signs should be illuminated under normal conditions (signs that are not internally lit or back-lit should be lit by primary or secondary lighting). Internally lit or back-lit signs should remain illuminated in the event of power failure.

Where a fire risk assessment identifies the need for a sign, the sign should be displayed prominently, conspicuously and appropriately having regard to the environment and occupancy profile of the building. Fire safety signs should not be sited such that they are overridden with other types of public information or property management signs, and should be consistent in style and design throughout the building.

Signs should be provided in stairways to identify the current floor, and the final exit.

NOTE 3 Consideration might need to be given to the provision of signage in appropriate language(s) for the intended occupants of a building, and/or to the provision of special signage for sensory-impaired people.

The location of fire safety signs should be recorded in the fire safety manual (see Clause **6** and Annex A).

7.4.5 *Access to the building and its surroundings*

The building should be designed in such a way that access for the fire service to the building itself and to any fire main, foam or other inlet, and fire appliance access to required positions within the building, can be kept free of obstruction.

The means by which occupants might expect to leave [see DD 9999[1)]] should also be taken into account, since people using these routes can impede fire service access.

Fire service access roads and gates leading to the building can become seriously obstructed by the indiscriminate parking of cars and other vehicles using the site. Control and enforcement of parking restrictions can prove difficult, but the provision and maintenance of notices giving clear instructions regarding parking arrangements can go some way to alleviating this problem.

[1)] In preparation.

It is important that fire service access roads are provided which can be kept clear and unobstructed to allow access by the fire service and other emergency vehicles at all times. Parking and signage should be provided to reduce the likelihood of cars being left on these roads. In particular:

a) means should be provided to ensure as far as possible that roads and service roadways used for fire service access are not obstructed in an emergency and that emergency vehicles are able to proceed to within the required distance of any fire main, foam or other inlets. In the interest of security, it might also be necessary to agree with the fire authority to restrict entry along such roadways;

b) when making provision for car parking, the designer should take account of the fact that cars parked within the building or nearby will often need to be left there until after an emergency (e.g. if the car owners have to report at assembly points), and of the associated risk of impeding access to the fire service;

c) assembly points should be located sufficiently far from the premises to minimize interference with the fire service or danger from falling debris.

7.4.6 *First-aid fire-fighting*

Nearly all large fires start out as small fires and if they can be dealt with quickly and safely then major incidents might be avoided.

First-aid fire-fighting equipment should be provided in accordance with BS 5306-0, BS 5306-1 or BS EN 671, and BS 5306-3. It should be of a type appropriate for the risks and for the users of the building, and placed in locations where it can be readily deployed.

Portable fire extinguishers should be selected and installed in accordance with BS 5306-8.

Fixed means of fire-fighting should be installed where the fire risk assessment shows it to be appropriate or necessary.

8 Commissioning and hand-over

8.1 Management issues

Before accepting a building for occupation it is essential that the safety of the staff and public (as well as that of construction personnel if the building is being completed in phases) is assured by ensuring that all safety systems are properly installed and operational.

The design and construction of the building and the systems installed in it should be recorded in the fire safety manual (see Clause **6** and Annex A).

On completion of the fire safety system, the complete installation should be checked for conformity to the approved drawings and system design. Instructions on its use, planned maintenance and testing should be supplied to the owner of the premises and included in the fire safety manual (see Clause **6** and Annex A).

The hand-over procedure should include operation of the system by actuating smoke detectors if appropriate. All elements of the system and control interfaces should then operate automatically. Checks should be made to ensure that any heating, ventilation and air conditioning system (HVAC) does not affect the operation of any smoke detectors.

All fire safety systems should be individually tested to establish whether the final installation conforms to the agreed design specification, is functioning correctly and is ready for acceptance testing. It should be documented in writing that the installation of each system component is complete and the component is functional.

Acceptance testing should be carried out to determine whether the final integrated system installed conforms to the agreed design specification and is functioning correctly. The extent and form of any acceptance tests should be agreed with the enforcing authority at the design stage, but they should include demonstrations that determine whether the correct outputs are produced for given inputs for each control sequence specified. Any non-conformities or malfunctions should be corrected before the system is activated. Upon activation, operation of all active elements (e.g. fans, dampers, doors and related equipment) should be recorded and verified.

If standby generators are installed to provide emergency electrical power, these should be checked for effective operation. If a standby generator is common to a number of emergency systems, then this check should be carried out with all the systems powered by the generator simultaneously to ensure that the maximum potential load is tested.

All installed safety systems should be operational before:

a) the building (or part of the building) is accepted;

b) units are handed over to tenants in mixed user developments and premises.

The appropriate members of the management team should be available during the hand-over period to ensure that an understanding of every aspect of the building is passed on.

The use of all installed safety systems should be demonstrated, if necessary by full commissioning tests involving fire and/or smoke, with the appropriate members of the management team and fire service present. Such tests have a number of purposes, including:

1) demonstrating the soundness of the safety system design;

2) identifying any problems of detail not considered in the design;

3) demonstrating that the design has been properly implemented;

4) identifying any problems with interactions, or failures to interact;

5) providing management with the opportunity to operate the systems;

6) giving confidence to the users of the building;

7) giving confidence, and training, to the fire service.

The management team should be provided with the fire safety manual (see Clause **6** and Annex A).

Where various functions interface, e.g. smoke detection and smoke control, these systems should be commissioned together to ensure that the prescribed fire safety procedure is implemented.

All components of any installed safety system for which a tenant is responsible should be operational and compatible with the systems common to the complex before the tenant occupies their unit (e.g. the public address system of the complex needs to be able to override any background music or public address system in a unit).

Guidance on commissioning and hand-over of fire safety installations other than smoke control systems is given in the appropriate systems standards. The commissioning and hand-over of smoke control systems should be carried out in accordance with Annex E.

8.2 Approvals and certification

All documentation relating to approvals and certification should be made available to the fire safety manager and should be included in the fire safety manual (see Clause **6** and Annex A).

Any outstanding issues, conditions or other implications should be stated on the approvals documentation.

9 Managing occupied buildings

9.1 Appointment of fire safety manager and other personnel

A competent person should be appointed as fire safety manager. This person should be given sufficient stated authority, powers of sanction and resources to take responsibility for the day-to-day safety management of the building and to ensure that essential repairs or maintenance are carried out. The powers of sanction might include closing the building to the public, restricting its use, or shutting down normal operations.

The role of fire safety manager may be combined with other health, safety or security functions. In small occupancies the role of fire safety manager may be assigned to the owner or general manager.

The fire safety manager should appoint a duty safety officer on every shift to be the key decision maker in responding to a fire incident. A duty safety officer should be present at all times whenever the building is occupied. The most appropriate person could be the senior operator in any central control room who is likely to receive the most information about a fire incident. In the case of a fire incident, the duty safety officer should hand over control to the fire service on their arrival but should be available to provide advice to the fire service on request.

Other fire and security personnel should be fully briefed as to the extent of their duties concerning precautions against fire during and outside working or opening hours. Fire safety training should be given in accordance with Annex F.

In some buildings fire marshals/fire wardens should be appointed to assist in an emergency, in particular with evacuation.

9.2 Management organization and structure

The tasks of the fire safety manager (see **9.1**) are likely to interact with other management functions such as facilities management, safety management and security. Such management functions should be integrated in such a way as to avoid conflicts as a result of overlapping responsibilities, or discontinuities in coverage. In an occupancy where a single person has responsibility for all aspects of safety, this is likely to be straightforward, but where two or more persons are responsible for different aspects of safety, e.g. fire safety and security, it is important to define clear areas of responsibility.

In a complex, a fire safety manager should be appointed at senior level to take responsibility for day-to-day safety management, but a committee of senior staff should also be appointed, to be responsible for the major facilities or operational units in the complex. This committee should be headed by the fire safety manager and should include such persons as:

— managers of larger units, e.g. fronting shopping precincts;

— managers of cinemas, theatres or other entertainment venues;

— operators of other discrete parts of a complex, e.g. offices, hotels or transport termini.

The committee should review safety matters and exchange information on special events, changes in operations or proposals for physical alterations that could affect safety management.

The safety management structure should reflect the expectations of the public. For example, in an airport the public might look to the carrier's staff for help, rather than the airport operator's staff, or in a hospital, the public might look to any of the medical staff.

The safety management structure should provide for:

— clear lines of responsibility, authority, accountability and resources, particularly in relation to common areas;

— replacements during the absence of persons with specific responsibilities;

— an emergency services liaison officer to call, and provide information to, the fire service.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

The safety management structure should reflect changing work patterns or changing operational management structures, but frequent changes in responsibilities or procedures should be avoided.

9.3 Overview of the fire safety manager's responsibilities

NOTE 1 Attention is drawn to legal duties relating to fire risk assessment and to the terms, conditions and restrictions imposed by any licence.

The fire safety manager should:

a) be aware of all of the fire safety features provided and their purpose;

b) be aware of any particular risks on the premises [e.g. issues relating to hot work (see **10.6**) or unusual construction materials such as sandwich panels];

c) be aware of their responsibilities towards disabled people (see Clause **14**);

d) be in attendance on the premises whenever members of the public are present or when the building is occupied;

NOTE 2 It is acceptable for a competent person other than the fire safety manager to be in attendance at such times, provided that this person has been delegated in writing and that cover is not interrupted.

e) liaise with, and where necessary seek the advice of, the fire authority, the licensing authority and other relevant enforcing authorities;

f) have powers to deal with individuals who sabotage or tamper with safety systems, who ignore any smoking policy, or who block exits;

g) liaise with other fire safety managers in a multi-occupancy building (see **9.4**);

h) ensure that public areas are suitably controlled (see **9.5** and Annex G);

i) ensure that tenants, concessionaires and caretakers are appropriately briefed (see **9.6** and **9.7**);

j) ensure that all necessary and appropriate communication systems are in place to deal with any fire incident (see **9.9**).

The management of fire safety encompasses the entire life cycle of the building and includes:

— day-to-day operation of the building;
— changes to the building (extensions, alterations, refurbishment);
— changes of use;
— units in disuse;
— demolition;
— the fire, if a fire occurs.

The responsibilities of the fire safety manager therefore include:

1) identifying and reducing the likelihood of fire occurring;

2) developing and implementing a fire strategy appropriate for the particular risk;

3) training of staff and maintaining training records;

4) inspection, maintenance, and testing of potential hazards (e.g. heat-dissipating equipment);

5) monitoring and maintenance of means of escape, evacuation procedures, monitoring the behaviour of occupants and adjusting plans accordingly;

6) maintaining access and egress and other special provisions for disabled people;

7) routine maintenance and testing of fire safety equipment, systems and procedures;

8) inspection, maintenance and testing of emergency communication systems;

9) monitoring general maintenance and building works that might affect the fire safety provisions;

10) supervision, monitoring and instruction to contractors and subcontractors on the premises;

11) agreeing the safe system of work for non-routine activities where these increase the risk from fire, including issuing hot work permits;

12) ensuring compliance with the appropriate British Standards;

13) notifying the authorities of any changes that might affect the fire precautions in the building, e.g. structural alterations, extensions, alterations to internal arrangements or commencement of keeping explosives or highly flammable materials.

Additional responsibilities of the fire safety manager, primarily in larger buildings, include:

i) the appointment of fire marshals/fire wardens;

ii) the appointment or delegated appointment of members of any site fire team;

iii) development of the training policy for the building;

iv) ensuring that staff have the necessary competencies;

v) organizing periodic audits to review:

— current fire safety management procedures;
— the effect of changes in personnel or in usage of the building;

vi) ensuring the effectiveness of automatic fire safety systems, i.e. that they are suitable even after a change in building usage;

vii) continuous safety system reviews and risk assessment (especially after refurbishment);

viii) monitoring and control of refurbishments and other building works;

ix) carrying out checks prior to entry by members of the public;

x) maintaining emergency plans (including evacuation plans, victim help and emergency accommodation plans) and fire control centre functions;

xi) regular trials of the fire safety system (including major incident simulations);

xii) monitoring and reviewing the fire safety manual (see Clause **6** and Annex A);

xiii) maintaining documentation for the fire safety manual, including training records, test evacuation records and details of "near miss" events;

xiv) recording changes to the building;

xv) contingency planning for abnormal occupancy levels;

xvi) contingency planning for equipment failure or repair;

xvii) responding to any rare or unexpected events that could increase the risk of fire or affect the evacuation procedures, e.g. by limiting the number of people permitted on the premises;

xviii) consideration, and if appropriate preparation in collaboration with appropriate local authorities, of disaster plans, where a fire incident could affect the local community (e.g. from smoke or water pollution);

xix) assessment and mitigation of potential environmental impact of fire (e.g. water run-off) in collaboration with appropriate local authorities;

xx) planning for bad weather.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

In buildings in which there is overnight occupancy, e.g. hotels, the fire safety manager should put measures in place to identify persons who might require assistance in an evacuation, e.g. by encouraging such persons to make themselves known during check-in procedures.

9.4 Buildings occupied by more than one organization

Where a building is occupied by more than one organization, fire safety precautions and facilities should be in place for all common or public areas as well as for the individual areas occupied by each organization.

The fire safety managers of each individual organization should liaise to ensure that:

— the emergency procedures are clearly understood by all relevant parties;

— every aspect of the fire safety precautions and facilities is clearly allocated to be the responsibility of at least one party;

— no element of the procedures is unreasonably duplicated.

NOTE The responsibilities of fire safety managers of individual units and occupancies are in no way diminished by the existence of a further tier of management with a wider span of control.

Where fire safety management is outsourced, e.g. as part of facilities management, then final responsibility should reside within the main organization.

9.5 Public areas

Fire safety management is particularly important in buildings that contain large public spaces (e.g. atria), as such spaces can contribute to the rapid spread of fire and smoke, putting a large proportion of the occupants at risk simultaneously.

The fire protection systems in such areas are generally operated automatically, e.g. sprinkler and smoke control systems.

The control of conditions in public areas should be carried out in accordance with Annex G.

9.6 Tenants and concessionaires

Where a building is occupied, or partially occupied, by tenants or concessionaires it is important that any tenants or concessionaires are integrated into the fire safety arrangements for the building and do not, and are not permitted to, negate the fire safety arrangements for the building. The fire safety manager should advise such persons formally of the fire safety arrangements for the building, what to do to prevent fires occurring and what to do in the event of a fire. This information should be contained within a tenant's handbook which should also address the potential for particular problems arising where tenants employ sub-contractors, e.g. for fit-out work.

Owners of residential buildings (flats and maisonettes) should follow the recommendations given in Annex H.

NOTE Annex I contains information that can be given to owners and occupiers of domestic dwellings, including flats and maisonettes. Examples of fire instruction notices for residential buildings are given in Annex J.

9.7 Caretakers

Where a caretaker or other person is employed to maintain common areas within a building, the fire safety manager should advise such persons formally of the fire safety arrangements for the building.

The owner may delegate management responsibilities to a caretaker. In such cases, the caretaker may be given the role of fire safety manager, provided that the owner gives the caretaker the authority and resources needed to carry out the role in accordance with the recommendations given in this part of BS 5588.

9.8 Continuing control and audit procedures

An annual audit should be carried out to review:

a) current fire safety management procedures, including maintenance procedures;

b) the effect of changes in personnel, or in usage of the building;

c) the effectiveness of automatic fire safety systems, i.e. to ensure that they are suitable even after a change in compartment usage.

The findings of the audit should be included in the fire safety manual (see Clause **6** and Annex A), with any resultant remedial changes. The audit may be part of the testing and review of the fire safety manual (see **A.5**). Criteria to aid in the audit of the management system are given in **4.2**.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

9.9 Communications

The potential for loss of life in fire is greater in large and/or crowded and/or complex buildings. Effective communication is therefore an essential part of successful fire management.

The fire safety manager should ensure that all necessary and appropriate systems of communication are in place to deal with any incident, including both equipment and chains of command.

Issues that should be addressed include:

— the communications structure, in particular where there is a cascade decision process involving a number of levels of management, or when it is intended to investigate first alarms before sounding warnings, or if control room staff are taking decisions based on many channels of information;

— the need for testing and auditing the communication systems as part of the testing and auditing of the overall fire safety procedures;

— the need for routine maintenance and testing of communication systems, including “emergency conditions” testing;

— selection of languages to use in voice messages;

— special provisions for sensory-impaired people;

— contingency planning, e.g. for abnormally high numbers of persons present in the premises, for absent staff or for equipment failure;

— planning for business continuity.

10 Fire prevention

10.1 General

The main “everyday” task of the fire safety manager is to attempt to avoid fires occurring; to work to create an environment in which fires are prevented from starting or, if they do, from developing beyond a very minor event. Preventing fire from occurring is as important as having properly working safety systems to deal with a fire incident. For the safety of occupants, the maintenance of furniture, furnishings, décor and equipment is as important as the maintenance of fire safety equipment.

The tasks of the fire safety manager to seek to prevent a fire occurring include:

a) monitoring the behaviour of occupants;

b) monitoring any policy on smoking;

c) housekeeping (see **10.2**);

d) routines for the disposal of waste;

e) minimizing hazards of combustible contents, furnishings and surface finishes;

f) minimizing hazards of materials, components and elements of construction;

g) establishing purchasing standards for furniture, furnishings and fittings;

h) seeking to avoid conditions leading to gas and dust explosion hazards;

i) maintenance of furniture, furnishings, décor and equipment;

j) reviewing and appraising the means by which a fire might start and spread, and the potential consequences;

k) maintaining integration with other systems (e.g. ventilation, communications);

l) assessing the risks from new equipment, new business processes or changing or new technologies;

m) issue and control of work permits and associated procedures;

n) training and education (see Annex F);

o) establishing and maintaining out-of-hours inspection and security procedures, including means of preventing arson (see **10.3** and **10.4**);

p) supervising and instructing contractors and subcontractors (see **10.6**);

q) routine checks, inspections, tests and monitoring the maintenance of equipment that could cause fires (especially heat generating equipment), chafing of cables, self-heating and fuel supplies (see **10.7**).

If necessary, separate teams should be set up to monitor all of the possible areas of hazard. Regular inspections should be carried out and should be logged in the fire safety manual (see Clause **6** and Annex A).

Smoking presents one of the greatest risks. Where practicable, smoking should be prohibited other than in designated smoking areas, and fire-safe ashtrays and bins should be provided.

10.2 Housekeeping

There are two primary aspects to housekeeping: reducing the chances of a fire developing or starting, and protecting escape routes (see **11.2**).

All employees should be made aware of the particular risks associated with hazardous substances and practices that can be encountered in factories and warehouses.

Where additional risks are introduced anywhere in the building, such as motor vehicles for display purposes, advice as to their storage and protection should be obtained from the appropriate authority. Grottoes in shops can present particular problems and advice should be sought from the fire authority.

The following general housekeeping measures should be taken to reduce the chances of a fire developing or starting:

— keeping combustible materials separate from possible ignition sources;

— storing flammable liquids, paints and polishes in appropriate containers;

— recognition of potential hazards;

— monitoring proper waste control (including waste bins);

— cleaning, including build-up of dust on machinery and extract ducts (especially from catering facilities);

— checks on electrical machinery over-load;

— clearing waste from the outside of the building (including grass and weeds);

— checking “dark” areas (e.g. cinemas or darkrooms);

— out-of-hours checks, or after closing;

— general inspection of all the fire safety equipment, including all passive fire protection provisions;

NOTE 1 Guidance on passive fire protection provisions is given in the Partners in Innovation publication *Ensuring best practice for passive fire protection in buildings* [5].

— any other routine precautions that are deemed necessary.

The following specific housekeeping measures should also be taken to reduce the chances of a fire developing or starting.

a) Arrangements should be made for electrical, oil and gas installations to be examined regularly by a competent person.

b) Refuse, waste paper, etc. should not be allowed to accumulate and should be stored separately pending its removal from the premises. Wherever possible, all combustible waste should be baled and removed from the premises daily.

c) Clear space should be maintained around heaters of all types, especially convector, tubular, or thermal storage heaters, and around vents of refrigerator compressor motors. Guards should be provided to prevent the close stacking of any combustible materials.

d) In store rooms, goods should not be stacked close to windows, and if there is a sprinkler system, goods should be stacked not higher than the height recommended in BS 5306-2 and BS EN 12845.

e) Floor surfaces (and floor covering) within escape routes should be maintainable, even and non-slip.

NOTE 2 These can be subject to controls under licensing.

f) Shop fittings, linings, special displays and grottoes should be constructed of materials that are not readily ignitable. They should be sited such that exits are kept clear and unobstructed, and exit signs should be visible from the relevant part of the premises.

g) The use of naked flames, smoking and other sources of ignition should be supervised or controlled.

h) The operation of shrink wrapping should be carefully conducted.

i) Lightning conductors and lightning protection systems should be routinely checked and maintained in accordance with BS 6651.

j) A daily inspection should be carried out after closing to ensure that the premises are left in a safe condition. Non-essential electrical services should be turned off at the mains. Any gas-fire equipment that is not equipped with flame supervision devices should be turned off.

NOTE 3 Where highly flammable or explosive substances are stored or used in excess of prescribed amounts, special requirements might be imposed by the relevant enforcing authority.

10.3 Audience/crowd control

The fire prevention routine for buildings admitting the public should be an everyday process. This is particularly important for buildings handling large crowds, such as places of entertainment or sports stadia.

Audience and crowd control, including pre-admittance checks, should be carried out in accordance with Annex K.

In addition, regular checks should be carried out during opening hours, and after the complex is closed at night.

10.4 Arson

Arson in buildings has increased greatly over two decades. The motives for arson are varied, but include spite, revenge, jealousy, pyromania, profit-making including insurance fraud following bankruptcy, the desire to damage competitors, fraud related to slum clearance, gaining possession of a building, and the desire of criminals to conceal their crime.

Arson can present a serious threat to life, especially if the fire is started with a rapid-burning material such as petrol or if the arsonist starts fires in several places simultaneously so that the alternative escape routes normally provided in a building are blocked. In commercial and industrial buildings, arson can also cause large direct losses and serious interruptions in business operations.

Good security arrangements can reduce the risk of arson (see **7.3.4**), but care should be taken to ensure that they do not prejudice the means of escape (see **10.5**).

The fire safety manager should ensure that any measures intended to prevent unauthorized access do not hinder the entry of the fire service to fight the fire or effect the rescue of trapped persons.

10.5 Conflicts between security and means of escape

There can be a conflict between security arrangements and means of escape, and the fire safety manager should ensure that security arrangements do not prevent occupants from reaching a place of safety. Security of the building can be in both directions: ingress and egress. In certain premises, e.g. prisons and secure hospitals, the need to restrict the occupants from leaving the premises should be taken into account when determining emergency procedures.

Security arrangements should also take into account the needs of disabled people (see **12.3**) and the needs of the fire service who might have to enter the building to effect rescue or assist with evacuation.

10.6 Contractors and subcontractors on the premises and hot work

Contractors and subcontractors can present an additional fire risk, as they are likely to be unfamiliar with the premises and with the associated fire risks and fire precautions. The risk is increased when contractors and subcontractors are carrying out hazardous activities such as hot work (e.g. cutting or welding), or when they are using substances that give off flammable vapours (e.g. some adhesives).

To minimize this risk, all activities of outside contractors should be strictly supervised and controlled. The supervision should include checks of any area where hot work is to be undertaken or where contractors have been engaged. The fire safety manager, or a delegated representative, should ensure that all necessary precautions against fire are taken, and should instruct contractors in fire safety procedures (see Annex F).

Arrangements should also be made for the safety of the contractors themselves in the event of fire.

NOTE See also Clause **16**.

10.7 Maintenance of building plant and equipment

Fire can start in machinery and equipment which is not adequately maintained or cleaned.

The fire safety manager should be aware of the equipment and processes within the building and ensure that this equipment and plant is being maintained in accordance with established good practice.

Electrical and gas installations are required to be regularly examined by a competent person who, if not qualified, should have authority to engage a qualified person to carry out any repairs deemed necessary for safety reasons.

11 Ensuring that systems respond properly in an emergency

11.1 General

The safety of people in a building when a fire occurs will depend upon the successful operation of the various built-in safety systems provided, both passive and active, as well as the successful implementation of the safety procedures. Since it can never be foreseen when a fire might occur, it is part of the role of the fire safety manager to ensure that all of the built-in passive and active safety systems operate (or are effective) on demand.

11.2 Escape routes

In order to ensure that escape routes are available for use at all times when the building is occupied:

a) all escape routes should be maintained free from obstruction;

b) goods, materials, unwanted furniture, etc. should not be stored within escape routes. Any obstruction should be removed immediately;

c) adequate provision for enclosed storage areas should be made within the building;

d) all escape routes should be inspected frequently and, in respect of buildings open to the public, on each occasion prior to the admittance of the public. A log detailing the frequency and results of inspection should be included in the fire safety manual (see Clause **6** and Annex A) and corrective measures should be taken where necessary. Door wedges should be removed;

e) fire doors that are intended to be kept closed should be closed and not obstructed;

f) fire doors on hold-open devices should be operable and should not be obstructed;

g) the exterior of the building should be inspected to ensure that final exits are not blocked by materials, vehicles or (in the winter) snow;

h) entrance halls, lobbies or corridors should not contain furniture or fittings that would reduce, at any point, the required exit width;

i) circulatory routes within sales, production and storage areas should be clearly defined, e.g. by the use of floor coverings of contrasting colour;

j) in a building or part of a building served by a single stair, and in fire-fighting stairs, furniture should not be placed within the stair enclosures and exits therefrom. In multi-stair premises, with the consent of the fire authority, furniture may be placed within the entrance hall forming part of one protected stairway only, provided that upholstered furniture is kept to a minimum and is of a type not easily ignited (see BS 5552);

k) fire safety signs and notices, fire extinguishers, manual call points, escape lighting, fire doors and shutters should not be obscured, even temporarily, by stock, or by advertising banners, posters, etc.;

l) seating areas should not be provided within escape routes;

m) maintenance and redecoration of surface finishes and floor coverings should not use materials that might propagate surface spread of flame and/or fire, or adversely affect the means of preventing such propagation;

n) the floor surfaces, including stairs, stair nosings, escalators and ramps, within escape routes should be maintainable, even and non-slip. Resilient floor surfaces should be maintained in accordance with BS 6263-2 and using only emulsion polish (i.e. not wax polish);

o) where staff might have to rescue occupants from locked rooms, e.g. hotel bedrooms, master keys to all lockable rooms should be available for designated staff.

11.3 Maintenance of fire safety equipment and provisions

Planned inspection, maintenance and testing procedures should be established and used to ensure that all fire protection systems can operate effectively when required. Arrangements should be made for all fire safety equipment, installations and systems (including fire detection systems, door control mechanisms, smoke control systems, evacuation and fire-fighting lifts, emergency lighting, standby power systems, escalators, and all passive fire protection provisions) to be inspected and tested on a regular basis by a competent person. Alterations, additions, repairs or modifications to services and equipment should be carried out only by competent persons.

NOTE 1 Guidance on passive fire protection provisions is given in the Partners in Innovation publication *Ensuring best practice for passive fire protection in buildings* [5].

Routine inspections and maintenance of fire safety installations should be carried out in accordance with Annex L. Routine inspections and maintenance of ventilation and air conditioning ducts should be carried out in accordance with Annex M. Operational tests, routine inspections and maintenance of fire-fighting lifts should be carried out in accordance with BS EN 81-72. See also BS 5588-5.

Management procedures should ensure that control is exercised over the parking of commercial vehicles on service roadways also used for fire service access, so that fire appliances are not obstructed in an emergency and are able to proceed to within the required distance of fire main, foam or other inlets. In the interests of security, it might be deemed necessary, in agreement with the fire authority, to restrict unauthorized entry along such roadways.

Routine maintenance, inspection and testing for particular systems should be carried out in accordance with the following British Standards:

a) BS 5839-1 for fire detection and fire alarm systems;

b) BS 5266-1 for emergency and escape lighting systems;

c) BS 5306-2 and BS EN 12845 for automatic sprinkler systems;

d) BS 8214, BS EN 1155 and BS 5839-3 for fire doors and fire door automatic release mechanisms;

e) BS 7346-2, BS 7346-3 and BS EN 12101-2 for smoke control systems;

f) BS 5306-1 or BS EN 671 and BS 5306-3 for portable fire extinguishers and hose reels;

g) BS 5306-4, BS ISO 14520, BS 5306-5, BS 5306-6 and BS EN 12416-2 for gaseous, foam and powder extinguishing systems;

h) BS 5306-1 or BS EN 671 for fire hydrants and fire mains;

i) the appropriate part of BS 7036 for automatic opening doors.

NOTE 2 BS 5588-5 gives additional recommendations for fire hydrants and fire mains, and also gives recommendations for evacuation lifts for disabled people and fire-fighting lift installations.

A record of all tests and checks, and any defects remedied, should be maintained in the fire safety manual (see Clause **6** and Annex A).

12 Planning the response to a fire

12.1 General

The task of the fire safety manager in planning the response to a fire is to seek to ensure, in the event of a fire, that all occupants escape to a place of safety quickly and without injury or distress. This requires that occupants firstly react promptly to any alarm, and secondly exit the building by the most efficient route.

In a complex building this will usually require that trained staff assist other occupants who are not necessarily familiar with the building or its safety systems.

The tasks for the fire safety manager in planning for a fire include:

— staff training and test evacuations, including full evacuations;

— reviewing all plant and equipment interface controls, to ensure that they properly mesh with agreed procedures;

— continuous inspection and testing of system and emergency procedures (including major incident simulations);

— testing under simulated "emergency" conditions;

— carrying out safety audits and inspections;

— responding to false alarms;

— learning from and recording test evacuations, false alarms, near-miss events and minor incidents;

— reviewing staff duties and training procedures;

— checking the record as-built drawings and specifications for all fire protection measures;

— feedback from, and to, participants, from staff, other occupants etc. from test evacuations;

— managing the site fire team;

— liaising with the external fire service, and provision of an "emergency pack" (see **13.7**);

— monitoring and recording, in the fire safety manual (see Clause **6** and Annex A), revisions to safety plans.

Specific plans may include:

— developing and maintaining emergency plan(s) (including evacuation plans, victim help and emergency accommodation plans);

— planning for bad weather (including evacuation into hostile weather conditions);

— plans for the mitigation of potential environmental impacts of fire (e.g. water run-off);

— risk management, contingency planning, restart planning;

— contingency plans for salvage and damage control.

12.2 The fire routine

The fire routine sets out the actions to be taken by staff on discovery of a fire or on the raising of the alarm. Advice should be sought from the fire and licensing authorities when drawing up the fire routine.

The emergency actions (see Clause **13**) should form the core of the fire routine, but it should also take account of:

— the uses to which the premises are put;

— the means of giving warning and the means of communication that are available within the premises;

— the relationship between trained staff and other occupants;

— the familiarity of occupants with the building;

— the availability of fire marshals/fire wardens or a site fire team;

— the needs of all occupants, in particular those of disabled people who might need additional assistance in the event of a fire (see **12.3** and Clause **14**).

The fire routine should be tailored to the building, kept simple and should minimize the decisions that have to be taken to cope with an incident, but it should cover every situation from a false alarm to a major incident.

"Fire instruction" notices should be exhibited at conspicuous positions in all parts of a building, including residential buildings, stating in concise terms the essentials of the action to be taken upon discovering a fire and on hearing the fire alarm.

NOTE 1 Examples of fire instruction notices for residential buildings, shops, offices, industrial and storage buildings are given in Annex J.

Specific roles should be delegated to specific members of staff.

Master keys should be given to members of staff who have been designated to assist in an evacuation. Such persons should be instructed to carry the keys at all times.

NOTE 2 Nearly all big fires start off as small fires. Many minor fires do not appear to be (and are not) life-threatening, and can be successfully extinguished with portable first-aid fire-fighting equipment. However, if this initial judgement is faulty then disaster can follow and this is a key issue for the fire routine and for training (see Annex F).

12.3 Provision for disabled people

Fire safety procedures should, where appropriate, make provision for occupants who might need assistance to make their way to a place of safety in a fire. If there is a need to make specific arrangements, especially in existing buildings, then consultation with the individual(s) or representative organizations should take place at the earliest opportunity.

Such occupants might include:

— mobility-impaired people;

— sensory-impaired people;

— people with mental ill health;

— the very elderly and the very young;

— people who are bed-ridden or otherwise non-ambulant;

— people who are intoxicated.

NOTE In the event of a large group of disabled people attending an event in an assembly building, it is advisable for the organizers of the group to discuss emergency evacuation arrangements with the management of the building (see also Clause **14**).

12.4 Fire control centre functions

Where a control centre is provided, it should be equipped in such a way as to give the control room staff the means of monitoring a situation and initiating appropriate action, and to enable them to provide appropriate verbal guidance, as necessary, to the occupants of the building in the event of a fire.

Public announcements should be compatible with, and take advantage of, the siting of fire exits and fire exit directional signs. The information should be succinct, unambiguous and believable, and should avoid presenting occupants with too many choices.

Recommendations for the management of fire control centres are given in Annex B (see also **7.4.2.1**).

NOTE BS 5588-5 gives recommendations for the equipping of fire control centres.

12.5 Evacuation management

Research indicates that a feature of fire disasters is the delay in people starting to move to safety. This "time to start" often exceeds the time needed to move to safety. There is also evidence that people do not respond quickly to simple alarm sounders. It is essential that there is an effective means of initiating and controlling the evacuation of premises such as a shopping complex where large numbers of people could be at risk.

Fire alarms in most smaller buildings are best operated in a "single stage" mode in which the actuation of a call point or detector gives an instantaneous warning from all fire alarm sounders for an immediate evacuation.

In large or complex buildings a staged evacuation procedure may be adopted, in which the operation of a call point or detector gives an evacuation signal on the storey or zone affected, and an "alert" warning signal sounds in all other parts of the premises. The decision to evacuate the remainder of the occupants then rests with the management and/or the fire service. It is essential that adequate means of communication between storeys or zones is provided. A public address system or voice alarm system is the most suitable way to control the evacuation process instead of fire alarm sounders.

If phased evacuation is to be used, it should be carried out in accordance with Annex N. Phased evacuation should be used only if the escape stairs have been designed for that use. Such evacuation is normally coordinated from a fire control centre, having directive public address announcements aided by colour closed-circuit television (CCTV).

NOTE 1 A staged alarm system enables two or more stages of alarm to be given within a given area, i.e. "alert" or "evacuate" signals, or "staff alarm" and "evacuate" signals.

NOTE 2 Phasing vertical movement can be necessary for a number of reasons, e.g. where people need to rest during the evacuation.

Members of the public might need to be guided to a suitable exit. People tend to follow the same route they used to enter the complex, or they might be disorientated or unaware of the location of exits, and if they arrived by car they are likely to try to return to it. If parents and children are separated they will tend to seek each other so as to leave together.

In premises open to the public the staff should be easily identifiable, preferably uniformed, and should have the training necessary to give instruction and assistance with authority so as to ensure prompt compliance with any public address announcements.

Staff whose duties include assisting members of the public should receive information in facilitating evacuation, which might also require specific training in helping persons who need assistance to evacuate to a safe part of the building or exit the building to a place of safety. All staff should be informed of the location of evacuation lifts and "barrier-free" routes (where provided) for people who might need assistance from the building.

Where escalators are provided in shops, the staff drill should include provision for nominated members of the staff to move to the foot or head (as appropriate) of each escalator on the sounding of the fire alarm or escalator alarm to control the use of the escalator.

Where the premises include separate areas, such as residential accommodation or private apartments, these should be included in these duties.

Further recommendations on specific issues relating to evacuation management are given in Clause **14** and Annex B.

12.6 Test evacuations (fire drills)

NOTE 1 Recommendations for evacuation procedures are given in Clause **13**.

Implementation of procedures should be tested at least once, but preferably twice, in each twelve month period and there should be a test evacuation of the entire building at least once per year. Staff employed in particular zones of a complex should take part in a test evacuation exercise at least twice per year. Any observed deficiencies in the fire safety management should be remedied, and any improvements found necessary to the management of evacuation should be reflected in formal amendments to the written instructions.

The purpose of any test evacuation should be clearly identified by the fire safety manager, and explained to the staff, so that it can be assessed afterwards. Objectives include:

a) testing management procedures;

b) providing staff with practical training;

c) establishing the effectiveness of training;

d) identifying weaknesses in emergency communications procedures and systems;

e) identifying positive and negative reactions of staff with designated responsibilities;

f) assessing the reliability of equipment;

g) rehearsing joint action with the fire service.

NOTE 2 Test evacuations can also be required by certifying authorities as part of their assessment.

While a test evacuation with members of the public is generally regarded as disruptive to trade, it is extremely important as staff members will gain invaluable practice in communicating with the public during evacuations. While the disruption caused might be reduced by holding exercises at less busy times, the greatest experience is gained by holding and monitoring a periodic exercise when the largest numbers are present. Useful experience and tests of communications between staff in units, and between units and the central control room, can be gained during more regular staff training exercises in which the public is not involved.

Monitored evacuation tests should be carried out shortly before and after the first full occupation of a new building. If the interval between the first and last phases of the building coming into occupation is more than about twelve months, it can be advisable to conduct a monitored evacuation in the interim period (see also Clause **15**).

Test evacuations should not be held at regular times to avoid staff or regular visitors becoming prepared for them. Each test evacuation should presume a different scenario, so that there is flexibility to cope with differing situations. In some test evacuations it can be appropriate to remove a stairway from service, to simulate smoke penetration. Test evacuations should be notified only to those people who have designated responsibilities, to make the evacuations as realistic as possible. Designated responsibilities should include witnessing the exercise and reporting back on its positive and negative aspects. People undertaking this task should not be otherwise involved in the evacuation (e.g. should not be given fire marshal duties).

When test evacuations are held, continuous monitoring of the exercise is essential, preferably by video recording, to allow a detailed comparison to be made afterwards between planned and actual activity, and to assist with training. For example, to assess the effectiveness of a public announcement, information is needed on its timing and audibility, as well as a record of the movement of people in the areas concerned. This same monitoring information should also be obtained from false alarms, "near miss" events and minor real incidents.

It is often difficult to avoid occupants being aware that the event is not a real fire. This is likely to influence their behaviour, in particular their sense of urgency. Results from test evacuations should be supplemented with findings from false alarms, where occupants might not be aware that there is no emergency.

On occasions it can be appropriate to undertake a test evacuation in collaboration with the fire service and, if large numbers of persons are involved, with the police.

Test evacuations should where possible include the procedures for evacuating disabled people (see **12.3** and Clause **14**).

NOTE 3 Particular care is needed when carrying out manual handling operations.

Employing fire safety systems as part of a test evacuation provides an opportunity to check whether such systems are creating unforeseen difficulties (e.g. pressures across doors) and whether software-controlled procedures [e.g. sequences involving closing down the heating, ventilation and air conditioning (HVAC), switching on fans and lights, opening vents, releasing doors and sounding alarms] are operating as intended.

If an evacuation has to be carried out in response to a bomb threat, the normal evacuation procedure should be used as far as practicable.

A full de-briefing of the exercise should be carried out so that any lessons can be learned and evacuation procedures amended if necessary.

The effectiveness and validity of incident planning should be recorded on both technical and procedural levels. The results of any test evacuation should be recorded in the fire safety manual (see Clause **6** and Annex A).

12.7 False alarms

False alarms can be disruptive and costly and can lessen the urgency with which both staff and public respond to an alarm. Steps should be taken to reduce the incidence of false alarms, by repair, modification or replacement of detectors, but without reducing sensitivity.

12.8 Contingency planning — Business interruption

The fire safety manager might wish to make contingency plans to cope with or avoid the interruption of business in the event of a fire. Such plans could include:

— preparing a list of contacts;

— arranging alternative premises;

— keeping duplicates of business records off-site.

Planning for business restart can form part of the overall risk management.

12.9 Protection of building structure, contents, and the environment

The fire safety measures taken to protect occupants of a building often protect its contents and structure as well, but the fire safety manager might wish to make additional plans for the protection of building structure, contents, and the environment.

NOTE 1 Building fabric and property protection are a particular issue for heritage buildings.

If there is any conflict between the need to protect occupants and the wish to protect building structure, contents, and the environment, the safety of the occupants should always take precedence.

NOTE 2 Advice is given in the Loss Prevention Council's design guide for the fire protection of buildings [6].

12.10 Salvage and damage control

Salvage and damage control are concerned with limiting loss and damage to the building fabric, contents and business operation. Plans might be made for action both during and after an incident. Pre-planning might include the identification of:

— the priority risks (permanent or movable objects);

— the best ways and means of removing and protecting priority risks;

— people involved and designation of roles;

— access to and facilities for people involved;

— aftercare of the risk.

To assist in the salvage and damage operation, information packs should be compiled and kept up to date. They should contain:

— a list of people to contact in an emergency;

— details of the roles of the people involved;

— building and room plans;

— description of risks;

— details of the mode and method of salvage;

— advance identification of, and arrangements with, salvage companies and building contractors;

— aftercare details.

Salvage operations should be carried out only after all the occupants of a building have been accounted for. Once the occupants have been safely evacuated, salvage operations may be coordinated with fire-fighting activities.

13 Emergency actions

13.1 General

The emergency actions that should be included in the fire routine (see **12.2**) include:

a) action on discovery;

b) warning and evacuation signals:

— interpreting and responding to signals;
— two-stage alarm systems;
— cascade alarm/decision systems;
— other communications;

c) calling the external fire service, providing information and advising them;

d) evacuation procedures:

— general evacuation procedures;
— fire evacuation procedures;
— evacuation control (i.e. from a control room);
— organizing evacuation;
— phased evacuation;
— search activities;
— dealing with the public (e.g. people with personal belongings or shopping);
— dealing with sleeping residents;
— dealing with occupants who require assistance, including disabled people (see **12.3**);
— motivating people to move;
— dealing with reverse flows (e.g. parents searching for children);
— mustering occupants;
— the use of refuges;
— audience/crowd control;

e) fighting the fire and other staff activity:

— action to be taken by senior fire marshal and deputy senior fire marshal;
— action to be taken by other fire marshals/fire wardens;
— selection of fire-fighting equipment, first-aid fire-fighting, other fire-fighting;
— managing the site fire team;
— managing control room operations;
— ensuring that active systems have activated;
— shutting down or ensuring that non-essential equipment is off;
— interaction with other personnel (in particular security) or other agencies;

f) meeting the external fire service, providing information and advising them;

g) completion of evacuation:

— accounting for occupants;
— care for displaced occupants;
— care and assistance of (uninjured) victims;
— provision of emergency accommodation;

h) re-entry to the building;

i) actions to be taken after the incident.

Other issues to consider include:

— preventing/minimizing business interruption;
— environmental protection;
— security/salvage and damage control;
— protecting the building contents;
— protecting the building fabric;
— recording lessons learned.

13.2 Action on discovery

A fire might be discovered by a person, or the occupants of a building might be alerted to a fire by the operation of an automatic fire detection system or an extinguishing system.

Building occupants should be instructed that on discovering a fire they should immediately raise the alarm locally, operate the fire alarm system and alert the appropriate persons, e.g. the control room if there is one, or a designated member of staff. In the event of a fire, the control room or designated member of staff should establish the location and apparent extent of the fire and assess the situation.

13.3 Warning and evacuation signals

The fire alarm evacuation signal normally consists of a continuous signal by means of bells, sirens, hooters etc., which indicates that all persons are required to evacuate the premises immediately.

In premises where a staged alarm system is used, the staff should be instructed, on being alerted, to take up their prearranged emergency positions before the general alert is given.

Where a phased evacuation is being implemented, staff with specific responsibilities, e.g. fire marshals/fire wardens, should proceed to their allotted duties to supervise the evacuation procedure.

Where voice alarms or other forms of communication such as visual display screens are available, more informative messages may be provided. In some buildings consideration needs to be given to the selection of additional languages that might be appropriate.

Whatever system is used it should be clear and unambiguous.

13.4 Calling the fire service

The fire service should always be called immediately to a fire by dialling 999 (or 112 from a mobile phone), however small the incident might appear (see also **12.2**), even if there is an automatic device for calling them. Notices giving the correct calling procedure should be posted conspicuously in appropriate positions.

If an automatic device for calling the fire service is provided, e.g. a connection from an automatic alarm or extinguishing system, it is vitally important that prior notification is given to the fire service of a proposal to carry out a practice or test and, if necessary, a code word should be agreed.

In premises which rely on a nominated person dialling 999 (or 112 from a mobile phone) during normal working hours to summon the fire service, additional persons should be nominated to ensure that provision is made for people who regularly work outside these hours, or to cope with unexpected absences of key staff.

13.5 Evacuation procedures

The evacuation procedures should define the evacuation sequence and should include provision for:

— buildings where there is overnight occupancy;
— buildings without evacuation lifts;
— buildings with evacuation lifts, including the management of such lifts;
— evacuation procedures for disabled people (see **12.3**);
— refuges and intermediate places of safety;
— the role of the structural protection;
— communications during the evacuation.

The evacuation procedures should ensure that:

a) everyone assembles at a place of safety and is accounted for, so that if anyone is missing the fire service can be informed on their arrival;

b) designated members of staff check that no one is left behind;

c) special arrangements are carried out to deal with the evacuation of mobility-impaired people;

d) persons are deterred from re-entering the building until it is safe to do so.

The evacuation procedures should also take into account the way in which people tend to respond to a fire alarm, particularly in buildings that are open to the general public or have a lot of untrained staff. Particular problems can include:

— persons being unwilling to evacuate the building if they have to leave personal belongings behind, including meals and unpaid-for shopping;

— persons wishing to take with them a coat or other outdoor clothing, particularly in the winter;

— persons who have entered the building with friends or family wishing to locate them, even if this necessitates moving away from the exits against the flow of evacuees (this is especially likely in buildings where crèches are provided).

Staff should be trained to deal with such situations and to assist people to evacuate as speedily as possible, including providing reassurance that belongings will remain safe in the building.

NOTE Special procedures are needed to cope with crowds, especially in occupancies where crowds occur only occasionally, such as for special events (see also Annex K).

In the event of a general alarm to evacuate the building being given, all persons who have not been allocated specific fire duties should be instructed to leave in an orderly manner, without stopping to collect their personal belongings. Specific fire duties that should be allocated to trained individuals include:

1) supervising the evacuation from each storey, ensuring that all people have left each area and reporting to that effect to the senior fire marshal;

2) ensuring that doors are closed as each storey or section is cleared;

3) bringing passenger lifts immediately to the final exit level, unless this is the fire floor, and keeping them there during the fire emergency;

4) meeting the fire service on its arrival and giving all relevant information (see also **13.7**);

5) ensuring that everyone assembles at a place of safety and is accounted for, so that if anyone is missing the fire service can be informed on their arrival;

6) ensuring that people do not re-enter the building until authorized to do so;

7) instructing people not to move cars which are parked within or near the building, because of the risk of impeding access to the fire service.

Examples of evacuation strategies are given in Annex O. If phased evacuation is to be used, it should be carried out in accordance with Annex N. Examples of messages for use during a phased evacuation are given in Annex P.

13.6 Fighting the fire

In the event of a fire being discovered, the agreed fire procedure, including raising the alarm and calling the fire service, should always take priority. However, attempts may be made to fight the fire with the equipment provided, if:

a) trained staff are available for the purpose;

b) it is deemed safe to do so;

c) such action would contain or extinguish the fire;

d) it is likely to have a direct and immediate effect in protecting life.

If it is necessary to abandon fire-fighting, the staff involved should be instructed to withdraw, closing doors behind them, and leave the premises.

The task of fighting the fire may be undertaken by the site fire team, if such a group has been appointed. The fire safety manager, or a delegated representative, may oversee these activities, and the evacuation, from any control room in the complex.

13.7 Receiving the fire service

It is essential that a person is on duty at the point of arrival of the fire service who is able to direct the fire-fighters to the affected area and is ready with any necessary keys, information about the building and other relevant help.

On the arrival of the fire service, it should be ensured that every assistance is given to enable them to attack the fire effectively, and in particular that they are informed of the situation as regards the safety and whereabouts of the occupants of the building.

To assist operational fire crews, an "emergency pack" containing essential information for fire-fighting, and indicating escape routes, special hazards and special procedures, should be prepared in advance in consultation with the fire service. This information should be extracted from the fire safety manual and kept in a readily accessible and secure location (e.g. a plans box) at the premises and/or with the agreement of the fire service, made available to the fire service in advance in hard copy, digital or other format. The emergency pack and its contents should conform to the recommendations given in Annex Q.

13.8 Completion of evacuation

On completion of evacuation, all staff should be instructed to report to a previously determined assembly point or points, which should be sufficiently far from the premises to avoid interference with the fire service or danger from falling debris. People should be instructed not to re-enter the building without the permission of the fire service officer in charge.

Where practicable, staff so appointed should attempt to account for all occupants of the building, e.g. by means of a previously established list of occupants. Where there are a number of exits from a building it can be advisable to gather evacuees for a roll-call.

Any pre-planned procedures (see **12.1**) with respect to issues such as the following should be implemented:

— care for evacuees (including provisions for accommodation, blankets and similar for night time or bad weather evacuations);

— reuniting family groups;

— notifying relatives and providing transport home;

— salvage;

— environmental protection.

13.9 Re-entry to the building

Following an evacuation of a building, re-entry to the building should not be permitted unless express permission is given to the fire safety manager by the senior responsible officer (e.g. senior fire safety officer, senior police officer or structural engineer) at the scene.

Full re-entry should not take place until the fire safety manager confirms that:

— the building is structurally safe;

— the building is free of contaminants;

— the necessary plant and building services are fully operational;

— the safety systems are fully operational, e.g. recharging of battery-powered emergency lights, resetting of fire alarm systems etc.

13.10 After the incident

Once an incident is over, the lessons learned from the incident should be recorded in the fire safety manual (see Clause **6** and Annex A) and improvements in systems and procedures implemented as necessary.

Information should be obtained from as many sources as possible to maximize the lessons learned. Sources of information can include:

— interviews with persons involved in the incident;

— logging systems used to record building information;

— fire detector actuation;

— security cameras.

False alarms, minor incidents and "near miss" events can also provide useful lessons. However, whenever an evacuation occurs as a result of a false alarm, as with an actual event, the opportunity should be taken to record the lessons learned and to assess, and improve, the whole fire safety system.

14 Evacuation of disabled people

14.1 General

Every effort should be made to identify any people who might have difficulty in evacuating and/or might need assistance, and appropriate procedures should be put in place to assist these people in the event of a fire.

Visitors and temporary residents (e.g. hotel guests) should be encouraged to identify themselves at the time of check-in/arrival if they are likely to require assistance in the event of an evacuation.

14.2 Use of refuges

During an evacuation some disabled people will temporarily rest in refuges while waiting for help to move from the refuge to a final exit and safety. In this event there are essential communication issues that those members of the building management who are organizing the evacuation of the building need to address. These building management members should find out:

a) how many disabled people there are;

b) the nature of their disabilities (see **12.3**);

c) the refuge or refuges in which they are located.

In addition:

1) the disabled people in each refuge should be assured that their presence there is known to the building management;

2) in order to avoid anxiety and confusion, the disabled people in each refuge should be kept informed of the situation and told about the action that building management is taking in order to effect their safe evacuation.

To address these issues there has to be a system of two-way communication between those temporarily waiting in each refuge, and building management members who are organizing the evacuation of the building. The two-way communication system needs to be such that it is readily operated by, and comprehensible to, disabled people.

14.3 Evacuation using stairways

Some disabled people (see **12.3**) need physical assistance to reach a final exit.

Visually impaired people can best be guided on level surfaces by allowing them to take a trained helper's arm and follow the helper. On stairways the helper should descend first and the visually impaired person follow with a hand on the helper's shoulder. If a visually impaired person is accompanied by a guide dog, the person should be asked how best the animal can be helped. Some guide dogs follow on their owner's command but generally, if a helper is leading a visually impaired person, the guide dog should be held by the leash, rather than the harness.

Whilst many disabled people are able to descend (or ascend) a stairway, possibly with assistance, others might need to be carried. Where wheelchair users need to be carried, it is generally preferable for them to be carried in their own chair, but evacuation chairs are an option. The method of evacuation should be discussed with the individuals concerned and incorporated into their Personal Emergency Evacuation Plan (PEEP) (see **14.5**).

Management should ensure that staff designated to help disabled people in the event of fire are fully trained in the techniques of helping to evacuate them.

NOTE Where equipment is provided to assist in the evacuation of disabled people (e.g. evacuation chairs, stair traversing devices etc.), it is important to ensure that its operational capability is maintained.

14.4 Evacuation using lifts

A lift to be used for the evacuation of disabled people (see **12.3**) should be either an evacuation lift or a fire-fighting lift and should be operated under the direction and control of the fire safety manager or a delegated representative. In some circumstances a lift in a separate fire compartment within a building can be used to evacuate disabled people during the first stage of a two-stage evacuation.

The lift car control should be switched on so that the lift car is under operator control, and the lift car should be taken only to those levels where a disabled person is in need of assistance.

The evacuation procedure for disabled people should begin at the first warning of fire. In premises where there is a two-stage fire warning system, this may be on the sounding of the "alert" or "first-stage" alarm.

Except in two-storey buildings, some form of communications system should be provided to enable the rapid and unambiguous identification of those storeys with disabled people requiring evacuation, and the relaying of this information to the person operating the evacuation or fire-fighting lift car. Such a system may consist of a control sited at each lift landing linked to the lift car call indicators. Requests may be made to the person controlling the evacuation, using visual indicators, or a telephone, and then relaying to the lift operator by telephone; or by a communications system, using personal radio transceivers.

NOTE 1 Communication systems recommended for fire-fighting lifts are not sufficient for an evacuation lift.

Staff immediately available at the final exit level (possibly security or reception staff) should be designated and trained as evacuation lift operators. At final exit level, help should be available to assist disabled passengers from the lift to enable a rapid vacation of the car and avoid congestion near final exits.

If an evacuation lift fails to arrive at a landing, or if access to it at any level is obstructed by the fire, a stairway should be used instead. Should the lift itself remain safe to use, it might only be necessary to descend to the storey below using the stairway and from there continue the descent by lift. It is necessary therefore to determine the best method of negotiating stairs (see **14.3**).

When the fire service arrives, the officer in charge should be briefed by the designated senior member of staff coordinating the evacuation, on both the position and circumstances of the fire and the progress of the evacuation. Subsequent priorities for use of evacuation lifts and fire-fighting lifts are then decided by the fire service.

Immediately on receipt of a fire alert signal, the member of staff designated to take control of the evacuation lift should:

a) determine the storey and part of the building indicated as the location of the fire;

b) determine the storeys at which disabled people are awaiting assistance;

c) take control of the lift and proceed to move disabled people to the final exit level.

At the same time, another designated member of staff should ensure that:

1) any disabled people in the storey for which that member of staff is responsible move to the refuge (lift lobby etc.) to await the lift;

2) the person controlling the evacuation lift is aware of any disabled persons who are waiting for the lift.

Unless a different order has been agreed with the fire authority, evacuation should normally be carried out in the following order:

i) the fire floor;

ii) the floor immediately above the fire floor;

iii) other floors above the fire floor starting at the top storey; and then

iv) all remaining floors.

NOTE 2 Actual fire conditions can necessitate changes to the planned sequence of evacuation.

A test evacuation, in which people who require help are assisted to a place of safety, should be carried out at least once a year and should be both horizontal and vertical (see also **12.6**). If members of the public are to be on the premises during the test evacuation, the fire service should be informed of the intention to carry out the evacuation and asked to cooperate in the exercise. A report recording the findings of the test evacuation should be prepared and circulated to members of staff. Conclusions reached from the experience that would improve easy and clear understanding of escape instructions and signage and the process of evacuation should be incorporated in a revision to the written instructions.

14.5 Use of Personal Emergency Evacuation Plans

Personal Emergency Evacuation Plans (PEEPs) are recommended for those people requiring assistance to leave the building. PEEPs are written by management in conjunction with the individuals concerned and are based on knowledge of the structural provisions within the building. They explain the method of escape to be used in each area of the building on a case-by-case basis, and when agreed are kept by the relevant parties. Where a building has many visitors, some of whom might be disabled, an acceptable option would be to provide standard plans that are available on request.

Through the recording of PEEPs, the management team should be made aware of the amount of staff support required for each evacuation.

15 Management of fire safety prior to full occupation of a building

NOTE Attention is drawn to the Construction (Design and Management) Regulations 1994 [7] in respect of fire safety in buildings under construction. Additional guidance is given in:

— Health and Safety Executive publication HSG 224 [8];

— Health and Safety Executive publication HSG 168 [9];

— Fire Protection Association publication *Fire prevention on construction sites — The joint code of practice on the protection from fire of construction sites and buildings undergoing renovation* [10].

Where there is partial or phased occupation of a building or complex, and during fitting out, then the guidance in this part of BS 5588 should be followed as far as is practicable. Added vigilance is often needed in these situations, particularly as fire safety systems might still not be in place or operational.

The following very general guidance applies.

— During construction work, and particularly when work is being carried out in buildings which are partially occupied, appropriate arrangements should be made to ensure the safety of escape routes and operation of all fire protection facilities.

— Where work is being carried out before fire protection facilities are in place, suitable alternative arrangements should be made for the safety of the building and its occupants.

— Management should ensure that arrangements are made for the instruction and supervision of contractors/workers in maintaining fire safety.

— Special attention is required to ensure that escape routes do not become blocked or obstructed by building materials etc., and that where work involves an escape route, sufficient alternative routes are provided and properly identified.

— Particular care is needed before any hot work is carried out (see **10.6** and **16.2**).

— If flammable substances, e.g. some adhesives and solvents, are to be used, the contractors should be specifically instructed to follow good safety practices, e.g. there should be no likely sources of ignition, including pilot lights on appliances, and the area should be well ventilated.

— Effective arrangements should be made to ensure that contractors are briefed on the actions to be taken in case of fire and are made familiar with the appropriate escape routes.

— A log of the contractors' attendance should be maintained so that at any time the number and location of all personnel can be ascertained.

The recommendations above are important in any circumstances, but are of even greater importance if work is being carried out in any part of the premises whilst the building is occupied, or if the premises are to be open to the public shortly after work has ceased.

Some buildings are speculative and have no known occupier at the time of construction. Either such buildings should be well equipped with fire safety provisions and anticipate the minimum of fire safety management from the eventual occupiers, or the management assumptions or implications should be stated in the fire safety manual (see Clause **6** and Annex A) as a limitation on the eventual use of the building.

16 Building works, alterations, decommissioning and demolition

16.1 General

NOTE 1 Attention is drawn to the Construction (Design and Management) Regulations 1994 [7] in respect of building works. Additional guidance is given in:

— Health and Safety Executive publication HSG 224 [8];

— Health and Safety Executive publication HSG 168 [9];

— Fire Protection Association publication *Fire prevention on construction sites — The joint code of practice on the protection from fire of construction sites and buildings undergoing renovation* [10];

— Institution of Structural Engineers publication *Appraisal of existing structures* [11].

NOTE 2 Attention is drawn to the Building Regulations 2000 [12], the Building Standards (Scotland) Regulations 1990 [13] and the Building Regulations (Northern Ireland) 2000 [14] in respect of approval for building works.

Experience has demonstrated that fires are more likely to occur when general maintenance work or alterations are being carried out to a building, most notably when work is being carried out by external contractors or subcontracting specialists. General recommendations for working with contractors and subcontractors are given in **10.6**.

Guidance should be given to both general maintenance staff and external contractors on:

a) the fire safety arrangements within the building, to ensure that they are not adversely affected by maintenance work or alterations;

b) procedures to avoid fire occurring, particularly in relation to hot work such as welding or cutting (see **16.2**).

Minor alterations to building design can have a significant influence on the effectiveness of arrangements for the detection and control of smoke. The smallest increase in the degree of roof covering, or even the removal of some roof coverings, could result in a change of predicted smoke flow. The substitution of materials used in decorative features, shop fascias or the walls of common areas, could change the rate at which fire might spread if it penetrated to those areas. The characteristics of materials used in roofs and ceilings are particularly important, as are their contours, and the decorative treatment of ceilings might have a significant effect on sprinkler discharge. It is also essential that no painting is carried out, or hanging decoration permitted, which would affect the operation or distribution of water from a particular sprinkler head.

There is a need for documentation in many cases, and a permit system for contractors carrying out any kind of structural work. Any form of heat process to be used should be the subject of specific permit approval and insistence on appropriate safeguards (see **16.2**).

Hazards can arise when buildings are in the course of extension or alteration but still partly in use. These hazards can arise as a consequence of one or more of the following:

— loss or diversion of escape routes;

— disruption of fire protection facilities, including the temporary loss of structural elements, such as walls, that might have a fire protection role;

— the presence of building materials that are flammable.

To address these hazards the following very general guidance applies.

— During maintenance work, and particularly when alterations are being carried out in buildings that remain occupied, appropriate alternative arrangements should be made to ensure the safety of escape routes and operation of all fire protection facilities.

— Where maintenance work is being carried out on fire protection facilities, suitable alternative arrangements should be made for the safety of the occupants and the building.

— Where flammable substances, such as some adhesives and solvents, are to be used, contractors should be specifically instructed to follow good safety practices, e.g. there should be no likely sources of ignition, including pilot lights on appliances, and the area should be well ventilated.

NOTE 3 This is particularly important if work is being carried out in any part of the premises whilst the building is occupied, or if the premises are to be open to the public shortly after work has ceased.

A log of the contractors' attendance should be maintained so that at any time the number and location of all personnel can be ascertained.

16.2 Hot work

Hot work should only be undertaken if no satisfactory alternative method is feasible.

Hot work is any procedure that might involve or have the potential to generate sufficient heat, sparks or flame to cause a fire. Hot work includes welding, flame cutting, soldering, brazing, grinding and the use of other equipment incorporating a flame, e.g. tar boilers etc.

A hot work permit procedure, which may be part of an overarching safe system of work/permit to work procedure, should be followed before any hot work is allowed in or near a building. This is to ensure that correct actions are taken before hot work commences, during the operation and afterwards.

Where hot work is necessary, it should be carried out in accordance with Annex R.

16.3 Change of use of buildings

NOTE 1 Attention is drawn to the fact that changes in the use of buildings can be subject to review by various regulatory bodies.

NOTE 2 The proposed use of a building is taken into account at the design stage (see Clause **7**) and is used as a basis for the fire safety specification (see Clause **6** and Annex A). Sometimes a building will be designed to allow for later changes of use [see Note to **7.1**c)], but generally the fire safety specification needs to be reassessed if the use of the building is changed.

Where there is a proposed change of use of a building, or where the scale of the operation within the building is likely to change, then the fire safety specification should be re-examined and assessed for the new use. The management assumptions and the level of management specified should either remain appropriate for the new use or be changed to suit (see Clause **5**).

Changes for which a reassessment of the fire safety specification is needed include alterations to the management structure, additional facilities or equipment retro-fitted to the building.

16.4 Units in disuse and areas decommissioned

16.4.1 *General*

Despite the supportive value of automatic detection and fire extinguishing systems, surveillance by human presence and immediate action taken in the very first stages of fire represent the most effective way of limiting its effects. When the human element is not present, as in the case of an unoccupied unit or a decommissioned part of a building, the occupants of the remainder of a building or complex are deprived of a first line of defence against fire.

Even if a temporary discontinued occupancy results in a reduction of the combustibles normally expected to be present in a unit, the importance of automatic fire protection within that unit or area is increased rather than diminished, particularly if work such as shop fitting is in progress.

Under these circumstances, surveillance by staff should be intensified to prevent any form of careless practice and to ensure that protective systems remain fully operative.

Any decommissioned area, unoccupied unit, or any unit that is in the process of being fitted out should be either:

a) physically separated from the rest of the building by construction having not less than 60 min fire resistance; or

b) protected by other fire protection measures as agreed by the relevant enforcing authorities.

In either case, the unused part of the building should be subject to routine inspection.

16.4.2 *Buildings in disuse or decommissioned*

The management of buildings that are in disuse or that have been decommissioned should focus on the prevention of fire starting and should include:

— ensuring that all power supplies are disabled;

— removing any material that might self-heat;

— removing any material that might be subject to an arson attack;

— maintaining security to prevent arson attacks.

16.4.3 *Buildings being demolished*

There is a greater risk of fire not being detected or controlled at an early stage in a building where many or most of the fire protection systems are disabled or missing. The management of fire safety in such buildings should take account of this.

NOTE Attention is drawn to the Construction (Design and Management) Regulations 1994 [7] in respect of demolition works and particularly in respect of the health and safety file, which is expected to include details of any hazards anticipated during demolition. Additional guidance on demolition works is given in BS 6187 and:

— Health and Safety Executive publication HSG 224 [8];

— Health and Safety Executive publication HSG 168 [9];

— Institution of Structural Engineers publication *Appraisal of existing structures* [10].

Annex A (normative)
Fire safety manual

A.1 General

A fire safety manual should contain design information and operational records. The design information forms the basis of an ongoing "history" document to which additional material is added when the building is occupied and at regular intervals thereafter. The designer is largely responsible for those parts of the fire safety manual that contain design information; further information is given in **A.4.1**. The fire safety manager is responsible for those parts of the fire safety manual that contain operational records, the fire safety policy statement and the fire safety specification; further information is given in **A.4.2**, **A.4.3** and **A.4.4**.

The fire safety manual should:

a) provide a full description of the assumptions and philosophies that led to the fire safety design, including explicit assumptions regarding the management of the building, housekeeping and other management functions;

b) explain the nature of the fire safety planning, construction and systems designed into the building, and their relationship to overall safety and evacuation management;

c) draw on the documentation produced at the design stage to describe the use of the various protection systems in each type of incident, and the responsibilities of the staff;

d) provide a continuously updated record of all aspects of the building and the building users that affect its fire safety.

NOTE Depending on circumstances the manual might need to be separate from the safety plan required by the Construction (Design and Management) Regulations 1994 [7], in which case the information from this should be duplicated in the manual. The actual form of the manual will depend on the type of occupancy involved.

A.2 Actions to be taken by the designer

It is the responsibility of the designer, in the first instance, to initiate and create the fire safety manual for a project.

Designers should inform their clients of the nature, function and capabilities of the fire precautions that have been designed into the building, especially those of which the nature might be less evident.

A.3 Actions to be taken by the fire safety management team

The fire safety manager and/or designated representatives should be responsible for the upkeep of the manual. The initial occupants of the building need to develop the manual provided by the designers at hand-over.

Provision needs to be made for recording the results of monitored test evacuations, the results of tests of the fire safety systems, and any other relevant information.

The fire safety manual should be made available for inspection or tests by auditors and regulators and for operational purposes by the fire service.

A.4 Contents of the fire safety manual

A.4.1 *Design information*

Where and as appropriate, the fire safety manual should contain full details of the following items or details of where the information is located:

a) fire safety policy statement (see **A.4.3**);

b) fire safety specification for the building (see **A.4.4**);

c) any identified fire risks, and particular hazards for fire-fighters (e.g. some types of sandwich panels);

d) control systems utilized throughout the building;

e) critical transportation routes for building services;

f) site plans, including the location of fire safety signs;

g) escape routes;

h) assembly points and/or muster stations;

i) access (exterior and interior) for the fire service and pre-planned procedures agreed with the fire service;

j) fire-fighting equipment;

k) communication systems;

l) a full description of the active and passive protection systems in the building;

m) a full description of all the other design aspects which have a direct bearing on the fire safety management, including the management level (see Clause **5** and Clause **14**);

n) an "operator's manual" for the fire safety systems;

o) an inspection, maintenance and repair manual for the fire safety systems, including details of routine inspection, maintenance and testing activities, with schedules, frequencies and routine test measures;

p) fire prevention and security measures (including measures for the prevention of arson);

q) details of interactions with security, building management, other safety systems, etc;

r) drawings of the building identifying any smoke control zones, fire detection zones, colour closed-circuit television (CCTV) cameras, public address or voice alarm zones and any other key equipment locations;

s) description of the basic fire precautions measures;

t) documentation from contractors and manufacturers (including any instructions, guarantees and test certificates) and spare parts;

u) as-built drawings, specifications, equipment-operating parameters and record drawings in accordance with BS 1635 for all fire protection measures, both active and passive, incorporated into the building;

v) the results of any acceptance tests of all installed safety systems (which might have involved the regulatory authorities and insurance company representatives);

w) any IT system used to manage the fire safety manual (e.g. maintenance schedules, record keeping);

x) information relating to approvals, certification and licensing, with copies of all certificates and licences;

y) pre-planned procedures for salvage;

z) other information etc. relating to other reasons for protecting the building – property, contents, fabric, heritage, environment;

aa) proposed testing regime for the manual.

NOTE Attention is also drawn to the information required by the Construction (Design and Management) Regulations 1994 [7] and currently applicable fire safety legislation.

A.4.2 *Operational records*

Where and as appropriate, the fire safety manual should contain full details of the following items or details of where the information is located:

a) safety management structure;

b) changes to management structure;

c) continuing control and audit plans, including the findings of the annual audit (see **9.8**);

d) a log detailing inspection of fire prevention measures (see **10.1**);

e) a log detailing inspection of escape routes (see **11.2**);

f) maintenance records of all heat-dissipating equipment and fire safety equipment (see **11.3** and Annex M);

g) changes to building systems and safety plans (see **12.1**);

h) the fire routine (see **12.2**);

i) testing of fire safety systems;

j) results of monitored test evacuations (see **12.6**), including:

— assessment of the pattern of response during different stages of the alarm sequence in different parts of the complex;

— timing and content of public address announcements (see **B.2**);

— specific problems for disabled people, including the audibility of alarms and messages, the visibility of signs and the usability of equipment, such as ramps and refuges;

— apparent interpretation of the announcements by public and staff;

— numbers of people using the different escape routes;

— timing of the stages of evacuation;

— faults identified and remedies implemented;

k) staff training records, including:

— date of the instruction or exercise;

— duration;

— the name of the person giving the instruction;

— names of the persons receiving the instruction;

— the nature of the instruction, training or drill;

l) planned maintenance procedures;

m) system failure and fault recording procedures;

n) contingency plans, including plans for salvage and damage control and business continuity;

o) housekeeping routines;

p) documentation detailing the tenant's role in the management plans of the complex;

q) safe system of work procedures for non-routine activities where these could increase the risk from fire, including hot work permits;

r) a log of contractors' and/or workmen's attendance;

s) changes to building structure;

t) information relating to any fire certificates or licensing;

u) information relating to fire risk assessments required by legislation, and a copy of any such assessments;

v) a "log book" of all events that occur over the life of the building that relate to fire safety;

w) any fire incidents or "near-miss" events and any lessons learned from them (see **13.10**);

x) false alarms and evacuations;

y) feedback from staff, occupants or other users of the building (see **A.5**);

z) results and changes following reviews and testing of the manual (see **A.5**).

NOTE Attention is also drawn to the need for information relating to regulatory requirements (e.g. building regulations/standards and licensing approvals).

A.4.3 *Fire safety policy statement*

When the fire safety manual is first created, only a proposed policy statement is likely to be available. It should be replaced by the full policy statement as soon as possible.

In order to develop and maintain the safety of the building, the building management team should formulate a policy statement appropriate to the building configuration, location, occupation, and if relevant, to the building users. The policy statement should include:

a) general safety issues related to the use of the building;

b) possible fire scenarios;

c) aims and objectives of the proposed management system and its methodology.

This policy should be endorsed by the highest level of management.

A.4.4 *Fire safety specification*

In order to develop a fire safety strategy in the fire safety manual, the specification for the building should be documented.

The following details should be included in the fire safety specification for the building:

a) a summary of the risk assessment, fire safety analysis and strategy. The emphasis of this analysis should be related to the performance requirements of the building;

b) a description of the philosophy, method of calculation, design and analysis software used, assumptions, inputs and outputs;

c) plans and layout drawings, including services;

d) identification of means of escape routes complete with recommended flow pathways for safe evacuation;

e) for complex buildings with phased evacuation, details of the appropriate escape flow/sequence;

f) a full description of the levels of passive fire protection provided throughout the building, including provisions for structural protection, compartmentation, protected shafts, fire-fighting shafts, cavities/voids and their respective protective barriers, fire doors, etc;

g) a full description of all the active fire safety measures, including detection, alarm, suppression, and smoke control systems, fans, dampers, and curtains;

h) integration of active and passive fire safety measures, the linkage between active and passive fire safety measures employed throughout the building and the extent to which this linkage applies;

i) identification of areas of high fire load, together with details of their provided protection and procedures for safe operation in those areas;

j) a concise description with performance ratings of the active systems employed, specified and identified on appropriate drawings, including:

— automatic fire detection controls;

— smoke controls;

— sprinklers;

— emergency lighting;

— way-guidance;

— communications;

k) clear identification of zoned areas of a building (e.g. fire alarm zones, hazardous area zones) supported by plans/drawings;

l) location of control panels and prime movers;

m) which, if any, computer models, virtual reality or CFD (Computational Fluid Dynamics) have been used in the design;

n) any assumptions made in the computer models from which the safety design was derived, the input data and output results, together with any changes to the design as the result of reanalysis using different or improved software;

o) any quantitative or qualitative risk assessments and sensitivity analyses.

Control systems utilized throughout the building should be clearly documented. Identification of controls should be made with respect to activation/sequencing of plant, including the procedures for start-up/shut-down and manual overriding of plant controls in a fail-safe manner.

Critical transportation routes for building services should be identified on the site plans. This includes air/smoke duct routes, electrical cable runways and other fluid/gas pipelines utilized in the building. Associated with these service routes should be the results of the risk assessment undertaken, complete with any fire protection provided.

The site plans should illustrate fully the fire service access facilities incorporated in the building design. There are two important aspects to this.

1) *Outside the building.*

The plans should show details of entry/exit points complete with clear routes for gaining access to the building from public roads. Specifications should show how access is achieved for the full range of emergency service vehicles. All other facilities provided for the fire service on the outer extremities of the building should be clearly identified and shown on the plans, e.g. wet/dry risers, water storage tanks and access points to fire-fighting shafts.

2) *Inside the building.*

The plans should show fire-fighting shafts and any details of facilities, including control systems, to assist the fire service.

A.5 Maintenance, review and testing of the fire safety manual

The fire safety manual should be kept up to date on a routine and regular basis by the fire safety manager or a competent person nominated for the task, so that the information described in **A.4.2** is included within one working week of any event. It should be updated as appropriate to record feedback from staff and other users of the building. If any fire safety equipment is found to be unreliable, records should be kept of the problems experienced. If deemed necessary, this information should be provided to the particular manufacturer.

The fire safety manual should be reviewed and its procedures tested annually, or whenever alterations are made to the building, in accordance with a documented procedure. The review should include:

a) all plant and equipment interface controls, to ensure that equipment is all in working order and that maintenance procedures are being followed;

b) all staff duties and training procedures;

c) records, as-built drawings and specifications of the fire protection measures;

d) responses to any false alarms, “near misses” or real fires that have occurred since the previous review.

Most of the testing should be a matter of routine activity for the management to ensure that prescribed activities are being properly carried out. Testing should where possible be monitored by senior management.

Records of reviews should be kept and of the changes made. If an IT system is used to manage the manual then it is particularly important to carry out regular checks that the requirements are being met.

Inspection routines should make provision for all systems installed in the building, such as fire alarms and smoke control equipment. They should include systems installed in units and other occupancies, as well as those that are the direct responsibility of the management of the overall building.

There should be a major building test evacuation at least once a year to test all of the systems and procedures in the fire safety manual (see **12.6**).

A.6 Location and access

The fire safety manual should be kept on the premises and should be made available for inspection by the fire enforcement authority or other relevant enforcing authority on request. At least one duplicate maintained identical copy should be retained in a separate location away from the premises.

Annex B (normative)
Fire control centre and evacuation management

NOTE See also **7.4.2.1**, **12.4**, **12.5**, **13.5** and Clause **14**.

B.1 Fire control centre management

The fire control centre in a building is where any centralized detection, alarm, communication and/or control functions are located. The fire control centre may be a panel (e.g. located at the building reception area), a dedicated fire control room, part of a central building control room, or be located remotely. Depending on the characteristics, including the extent, of a complex, certain functions of the control room are inevitably closely associated with its day-to-day safety management. This includes monitoring situations and providing verbal guidance to occupants. In extensive complexes it can be advisable to computerize the functions of the control room.

If a fire is discovered or suspected in a unit or other occupancy in a complex, there are certain actions that should be carried out by the people managing the fire control centre of the unit or other occupancy in question, and certain actions that should be carried out by the people managing the fire control centre of the complex.

a) The management of units and other occupancies should take the following actions.

1) Alert the central control room to the possible emergency.

NOTE The management of the complex are responsible for contacting the fire service [see item b2)].

2) Alert employees (or selected employees) to the emergency.

3) Establish the location and apparent extent of the fire and assess the situation.

4) Shut down non-essential equipment.

5) Organize and effect the movement and/or evacuation of the public and employees as determined by item a3).

6) Take steps consistent with the safety of individuals to fight the fire or contain it.

7) Ensure that, on arrival of the fire service, every assistance is given to enable them to attack the fire effectively, and in particular inform the fire service of the situation as regards the safety and whereabouts of the occupants of the unit or other occupancy.

b) The management of the complex should take the following actions.

1) Establish the location of the alarm of fire.

2) Send an alarm call to the fire service immediately with whatever detail has been prearranged as being necessary.

3) Alert appropriate staff to the occurrence and location of the potential emergency.

4) Organize and effect (as dictated by a responsible assessment of the situation and other information available) procedures prearranged with the fire authority, the movement of the public and employees in the areas affected, and the direction of the public in appropriate common areas.

5) Take steps to localize the effects of the fire and, if possible, contain it to the area or unit affected.

6) Ensure that, on arrival of the fire service, information is immediately available and every assistance is given, in accordance with previously agreed procedures.

The following actions should be taken in order for the fire control centre to carry out effective evacuation (see also **B.2**).

1) Control centre staff should have the training necessary in the delivery of emergency messages including giving instruction and assistance with authority, so as to ensure prompt compliance with public address announcements.

2) Where appropriate, back-up automatic message units should be provided from which a range of stored or pre-recorded messages can be selected.

3) Where public address announcements are to be given by control centre staff, special training and explicit guidance should be given to them on the delivery of emergency messages.

4) Announcements, both pre-recorded and live, should be worded and delivered in such a way as to provide reassurance and relevant information, but also to convey the sense of urgency necessary to motivate people to move promptly in the safest direction.

B.2 Evacuation management

Evacuation is best managed by the combined use of public address announcements and staff. Pre-recorded messages should not take precedence over live "directive" messages delivered by trained control centre announcers.

When establishing evacuation procedures in large or complex buildings, major features that need to be taken into account are the sophistication of the fire detection and alarm system and of the public address and/or voice alarm system.

Directive messages provide the occupants with the clear, prompt and accurate information they will need to move safely without delay. The use of public address systems should not be restricted to coded staff messages.

Recommended procedures for phased evacuation are given in Annex N.

Public address and voice alarm systems should be zoned where appropriate so that messages can be given in specific parts of the building. This permits evacuation to be conducted in stages. The design of the public address and/or voice alarm system should take account of the level of background noise, e.g. when any smoke control plant is running. If an automatic public address and/or voice alarm system is provided, it should be possible to override it.

Public address and/or voice alarm messages (live directive and pre-recorded non-directive) should be set out in the fire safety manual (see Clause **6** and Annex A) (and possibly a more detailed communications and training manual), and should be validated and updated on the basis of training and monitoring exercises.

All background sound systems, including temporary ones, should be silenced in the event of fire.

Annex C (informative)
Fire safety equipment, facilities and systems

C.1 General

This annex contains examples of fire safety equipment, facilities and systems requiring inspection, maintenance, testing and repair. The list is not exhaustive but conversely, not every building will need every item listed, and the designer therefore needs to take into account the particular circumstances of each building individually.

C.2 Detection

Examples of detection equipment, facilities and systems include:

— fire detection and alarm systems;
— smoke detection and alarm systems;
— intruder detection;
— integrated security and fire systems.

C.3 Alarms and communications

Examples of alarm and communication equipment, facilities and systems include:

— fire alarms and warning systems;
— call points, break-glass alarms, voice call-points;
— analogue addressable alarm systems;
— alarm sounders;
— voice alarms;
— two-stage alarms/communications;
— the location of alarm indicator panels;
— the arrangements for calling the fire service;
— siting of exit signs;
— signage, illuminated signs;
— means of communication between storeys or zones;
— public address systems;
— voice alarm systems;
— links to emergency power;
— any fire control centre;
— closed-circuit television (CCTV).

C.4 Suppression

Examples of suppression equipment, facilities and systems include:

— automatic sprinkler systems;
— portable fire extinguishers and hose reels;
— gaseous, foam and powder extinguishing systems;
— other fixed extinguishing systems (e.g. CO_2);
— water mist and directed water deluge systems;
— plant, pumps and plumbing;
— water tanks;
— bunds and run-off tanks;
— links to emergency power (see also **C.10**).

C.5 Smoke control

Examples of smoke control equipment, facilities and systems include:

— smoke control systems for means of escape and/or fire-fighting;
— smoke and heat exhaust ventilation systems;
— pressure differential systems;
— smoke seals on doors;
— standby fans and motors;
— links to emergency power (see also **C.10**);
— make-up air systems;
— smoke barriers.

C.6 Means of escape

Examples of equipment, facilities and systems for means of escape include:

— evacuation lifts and their associated equipment;

— evacuation chairs and similar equipment for disabled people;

— safety, emergency and escape lighting systems (including self-contained luminaires with sealed batteries);

— way-guidance systems;

— suitable (e.g. non-slip) floor surfaces within escape routes;

— openable windows on escape routes;

— door closing devices, door retaining devices, hinges and latches;

— protection measures provided for escape routes, especially those not in regular use;

— refuges, including protected lobbies used as refuges, and other nominated places of temporary safety;

— stairs, escalators and ramps.

C.7 Built-in fire protection

Examples of structural elements that can aid fire protection include:

— compartmentation systems, including fire doors, automatic release mechanisms and closing mechanisms;

— structural fire protection measures;

— penetration seals;

— intumescent seals;

— void or cavity barriers;

— other fire stopping and seals;

— protected means of escape;

— structural protection;

— protection measures provided for lifts and stairways protected from fire;

— fire-resisting glazing.

C.8 Fire-fighting

Examples of fire-fighting equipment, facilities and systems include:

— fire hydrants and fire mains, and associated valves, etc.;

— wet or dry rising fire mains and the inlet and/or outlet boxes;

— foam inlets to oil-fired boilers;

— outlet straps to fire mains;

— fire-fighting lift installations.

C.9 Control systems

Examples of control systems that can aid fire protection include:

— central controls to release any doors held open by automatic release mechanisms;
— the fire-fighting lift switch;
— any mechanical ventilation or pressurization systems;
— lift controls;
— escalator controls;
— door control mechanisms;
— evacuation and fire-fighting lifts;
— openings that are automatically opened by smoke detectors at the time of a fire;
— automatically operated air input fans which maintain a positive air pressure so that smoke is restricted from entering escape routes;
— connections to the fire service that are automatically and continuously monitored;
— fire control centres;
— "swipe card" and similar systems for access.

C.10 Power

Examples of power equipment, facilities and systems include:

— protected power supplies and cables;
— generators and batteries;
— diesel generator for the standby power supply;
— emergency lighting, standby power systems;
— lightning protection systems.

C.11 Access to the building and its surroundings

Examples of access facilities that can aid fire protection include:

— access roads;
— car parking;
— service roadways also used for fire service access;
— assembly point or points;
— access for the fire service to any fire main, foam or other inlet;
— fire appliance access to required positions within the building;
— automatic barriers;
— "swipe card" and similar security barriers.

Annex D (informative)
Signs and signage

Fire safety signs are divided into a number of categories, each category supporting and complementing an individual part of the fire safety management strategy.

a) *Means of escape signs and signing systems* are used to assist in an effective and efficient evacuation to a designated place of safety, e.g. exit, fire exit, exit for emergency use only.

b) *Way-guidance signs and signing systems* are used to assist in identifying escape routes by using a comprehensive arrangement of visual components, signs and markings in special circumstances or for specific categories of people, and are additional to the standard means of escape signs.

c) *Fire safety notices* are used:

— to inform and instruct building occupants of measures to be taken to maintain the integrity of passive fire protection, e.g. “fire door keep shut”;

— to instruct and inform building occupants of the actions to be taken in conjunction with fire alarms, evacuation procedures and/or emergency planning.

d) *First aid fire-fighting equipment signs,* incorporating the appropriate classification information, are used to identify the equipment type.

e) *Emergency equipment identification signs* are used for alarms, emergency telephone and other essential equipment.

f) *Emergency egress equipment signs* are used to identify devices and panic hardware provided specifically to ensure efficient and effective evacuation and to override security on an escape route.

g) *Fire-fighter facilities signs* are used to identify and locate equipment provided for fire-fighters e.g. dry riser, gas shut off, hydrant and fire plan.

h) *Hazard warning signs* are used to identify locations where there are specific risks associated with actions or procedures deemed to be hazardous.

NOTE 1 Site identification signs might be needed for multi-hazardous chemical storage at the perimeter and entrance to the site. This is usually determined in consultation with the enforcement authority.

i) *Prohibition signs* are used to prohibit behaviour likely to increase or cause danger.

NOTE 2 These are normally displayed in conjunction with hazard warning signs, e.g. “no smoking”, “no naked flame”, “no access for unauthorized persons”.

j) *Assembly point and safe area signs* are used to assist in the accountability of personnel in the event of evacuation.

Annex E (normative)
Commissioning and hand-over of smoke control systems

E.1 General

The procedures recommended in this annex should be carried out in addition to the general procedures for commissioning and hand-over recommended in Clause **8**.

E.2 Smoke ventilation systems

E.2.1 *General*

The volume flow of inlets for mechanical systems, and quantities, size and location of inlets for natural systems, should be checked and should meet the design criteria. If security doors are opened to provide inlets, or if security is maintained by means of an open mesh shutter, the inlet area could be reduced. In such circumstances, an assessment of the free area should be made and a correction factor applied in respect of any such door.

E.2.2 *Powered smoke exhaust systems*

The volume exhaust rate should be measured for the design fire. This should be obtained at ambient temperature.

NOTE 1 The volume extract (or supply) airflow readings should be taken either by using a vane anemometer at each extract grille, then totalling the readings, or by taking a Pitot traverse in an appropriate straight section of ductwork (approximately 4 m from any obstruction or outlet, etc.) for each fan, then totalling the results.

NOTE 2 Further information can be found in the *CIBSE Commissioning Code A* [15].

If standby generators are installed to provide emergency electrical power, these should be checked for correct operation. If standby generators are common to other emergency systems, these other systems should be powered by the generators to ensure that a reliable power supply is provided that can handle the full emergency load.

E.2.3 *Natural smoke ventilation systems*

The areas of the ventilators should be measured, and along with test certificates for ventilator aerodynamic coefficients, these should be compared with the figures required by the approved design.

NOTE This can be done by measuring a sample of each ventilator size and calculating the measured area by totalling the number of vents.

E.3 Smoke control systems employing pressure differentials

The commissioning and hand-over procedures for smoke control systems employing pressure differentials should be in accordance with BS 5588-4.

Annex F (normative)
Training

F.1 General

Fire safety training should form part of the planning, training and monitoring activity defined in the fire safety manual (see Clause **6** and Annex A).

All training should be given by a person who is competent both in the subject and in training.

Fire safety training should be continuous, commencing on the first day of appointment of new staff and continuing in the form of regular refresher training.

Induction training for new staff should be given on the first day of their appointment and should include instruction on what to do if fire is discovered and what to do when hearing the fire alarm; it should also involve a walk over the various escape routes. All staff, as soon as practicable after appointment, should receive comprehensive training in the general fire routine, basic fire prevention, the rules concerning smoking, and the terms, conditions and restrictions of any licence.

Thereafter, staff should receive sufficient training at regular intervals (at least once a year) to make sure that they remain familiar with the fire precautions for the workplace and are reminded of the action to be taken in an emergency. Training should be more frequent where there is a high turnover of staff or where there is a high risk of fire.

In so far as the responsibilities are applicable to their role, all staff, including part-time staff, security staff, cleaning staff and contractors should be trained and instructed in:

— basic fire prevention;
— good housekeeping;
— risk awareness;
— smoking policy;
— the fire routine;
— actions to be taken upon discovering a fire;
— knowledge of the escape routes, refuges and exits, especially those not in regular use;
— raising the alarm, including the location of alarm indicator panels;
— action to be taken upon hearing the fire alarm;
— arrangements for calling the fire service;
— special provisions for assisting disabled people;
— location of fire-fighting equipment;
— selection and use of fire-fighting equipment, including hand fire-fighting equipment (in larger premises it might be appropriate to train specific staff in this respect, rather than all staff);
— the importance of fire doors and the need to close all doors at the time of a fire and on hearing the fire alarm;
— process shutdown and shutting down non-essential equipment, stopping machines and processes and isolating power supplies, where appropriate;
— evacuation procedures (this includes reassuring any members of the public, escorting them to exits, and encouraging them to get well clear of the building);
— incident reporting procedures, including for “near misses” and false alarms.

Any members of staff who have particular responsibilities in respect of fire safety, including supervisory roles, should receive detailed instruction in their own duties and appropriate refresher training at least once, and preferably twice, in each period of twelve months. Persons with particular responsibilities are likely to include:

— department heads;
— fire marshals or fire wardens;
— fire-fighting teams in large workplaces;
— floor supervisors;
— central control room staff;
— security staff (including night security patrols);
— attendants;
— stewards;
— kitchen staff;
— engineering and maintenance staff;
— receptionists and telephonists.

F.2 Additional training for staff in large buildings

In larger premises it can be appropriate to train specific persons to ensure that all staff and members of the public are safely evacuated and that everyone is accounted for. Special arrangements can be needed in premises where there are only occasional visitors and where formal procedures to deal with such visitors are not practicable.

A person or persons should be delegated to liaise with the fire service on arrival, to confirm whether everyone has been accounted for, to determine the location of the fire and any special risks (e.g. the location of hazardous substances), and, where necessary, to make arrangements for the fire service vehicles to enter the site.

Security personnel should be fully briefed as to the extent of their duties concerning precautions against fire during and outside working/opening hours. This brief should include:

— the timing of patrols of all parts of the building;
— how and where to call the fire service in every case of fire or suspected fire;
— which telephone lines are connected to an exchange line (there should be at least one per floor, or more if the floor area is large);
— the action to be taken on finding a fire, including the use of fire-fighting equipment;
— the operation of automatic fire alarms, sprinklers, etc.;
— the safe operation of self-closing doors and shutters;
— the position of all main services controls;
— actions to receive and direct the fire service on arrival.

Contractors should be given at least the minimum instruction as recommended for new employees. They should also be trained in the fire safety precautions relating to their special tasks. If they do not have such training, they should be allowed to work only with supervision or after suitable training has been given. Particular attention should be paid to the fire safety training and education of persons carrying out welding or cutting, using blow lamps or other open flames, and other types of hot work, whether by employees or contractors (see also **10.6** and **16.2**).

The training should be based on written instructions provided by management and appropriate to the specific responsibilities of the members of staff.

The education of the tenants of every unit and other occupancy in the complex needs to form part of the planning and training activity defined in the fire safety manual (see Clause **6** and Annex A).

NOTE It is a matter for local agreement whether a tenant's staff are trained by the management of the complex or by the tenants' management.

The entire fire routine, including evacuation procedures, should be tested regularly by simulated emergencies without involving the public, or by staff carrying out a walk-through so that each stage of the procedure is examined. This should include a physical examination of the escape routes and emergency equipment and critical review of recommended fire instruction notices. See **12.6** for further information on test evacuations.

Details of all training and instruction given/received should be recorded in the fire safety manual (see Clause **6** and Annex A).

Annex G (normative)
Control of conditions in public areas

G.1 Combustibles in covered shopping complexes

Any fire in a public area, given the opportunity for growth, can present a greater risk to safety than one that starts in a unit. Additional fire risks are sometimes created in public areas by persons introducing combustibles into common spaces, e.g. by extending a sales display beyond the line of the front of a unit in a shopping mall.

As a general rule, the fire safety manager should ensure as far as possible that combustible materials are not introduced into public areas. To this end, a management permit system for the use of public common areas should be introduced, so that strict control can be exercised over any activity or use of the areas other than those related to access and egress by the public.

Combustible materials in a static form should not be permitted on upper walkways, or in any mall section that is less than 5 m in height or which incorporates any form of canopy.

Where combustible items and/or materials are used in displays, demonstrations or sales promotions, the fire safety manager should ensure that such items:

— are restricted wholly to ground level;

— present no surface more than 1 m in height;

— are entirely uncovered;

— are positioned not less than 3 m from openings to units or other occupancies;

— do not reduce the escape width of the public area.

Separately covered shops, kiosks, stalls etc. should be compatible with the agreed fire safety strategy for the complex and should not reduce the escape width of the public area.

G.2 Food courts, catering and demonstrations

In many complexes it is common to group together small catering outlets with shared customer seating (food courts). The fire safety manager of the complex should limit any combustible furniture or other materials in these areas and ensure the frequent clearance of food and litter, etc.

Public common areas are also frequently used for demonstrations and sales promotions. The fire safety manager should not allow such events to take place if there is a chance that they might introduce a fire risk into public common areas, or if they might negate the functions of, or reduce the sensitivity of, fire safety systems. For example, in common public areas, demonstrations and sales promotions should be avoided if they involve:

— the production of fumes or flammable aerosol suspensions;

— the use of flammable liquids in excess of 0.5 L; or

— the use of liquefied petroleum gas.

Any part of the complex which is devoted to the preparation and serving of refreshments should comprise a separated unit of the complex.

Where two or more organizations share the same area, management responsibilities should be formally allocated by the management of the complex.

G.3 Assembly and performance functions

Certain areas, particularly any that are generously proportioned or have upper-level walkway balconies, offer the potential for assembly and performance functions. Apart from any licensing arrangements, decisions whether to use the public common areas for such purposes depends largely on the exit facilities from each of the relevant sections of the levels involved.

Consultation with the appropriate licensing authority and the fire authority is necessary before permissions for this type of use are granted.

When a public area is used for assembly or performance functions:

a) all exit routes should be returned to their full effective width before the normal business of the complex is resumed;

b) the public common areas should not be used for the temporary storage of combustible items;

c) stewarding staff should be in attendance during the function, in numbers appropriate to the nature and location of the function and the number of people attending.

G.4 Leisure facilities

Apart from facilities intended for exclusive use by small children (e.g. crèches, play areas, individual machines for giving rides to children, roundabouts and funfairs), leisure and entertainment facilities should not be installed in the public common areas of a complex, but should occupy a separate unit.

All leisure facilities in a complex should be under the control of the management of the complex, and fire precautions should be put in place that are appropriate to the nature of the activity.

NOTE Guidance on safety provisions for fairground rides is given in the HSE publication HSG 175 [16].

G.5 General fire safety controls

In a complex, regular checks of the premises, which could be by closed-circuit television (CCTV), should be carried out during opening hours, and after the complex is closed at night.

The premises should be inspected at the beginning of each working day to ensure that:

a) access for the fire service to any fire main, foam or other inlet is not obstructed;

b) fire appliance access to required positions within the building is not obstructed;

c) the fire alarm system is operative.

All parts of the complex should be inspected regularly throughout the day with particular attention being paid to cloakrooms, medical rooms, etc., and to those parts not normally visited by staff.

Whenever members of the public are present in the complex, every part of the common public areas should be checked at 30 min intervals and every part of the non-public areas at 60 min intervals. In addition, inspections should be made of the common servicing areas following deliveries to units.

A daily inspection should be carried out after closing to ensure that the premises are left in a condition where the risk of fire is minimal.

Daily visual checks should be carried out in respect of the fire warning system, fire-fighting equipment and safety lighting, so that any obvious defects are discovered without delay.

When premises are to be left unattended, all non-essential electrical services should be turned off at the mains and any gas-fired equipment not fitted with flame supervision devices should be turned off.

Annex H (normative)
Recommendations for owners of multi-occupancy residential buildings

H.1 General

The recommendations given in this annex are intended for the guidance of owners or their agents in the day-to-day control of a building containing flats or maisonettes.

NOTE The recommendations given in this annex only refer to the responsibility of the owner for fire safety in this type of premises. The effectiveness of fire safety precautions depends on the cooperation of the people living in the individual flats or maisonettes. In order for the fire precautions to be effective, residents need to follow the instructions given on fire instruction notices in the building. Annex I contains information that can be given to owners and occupiers of domestic dwellings, including flats and maisonettes. Examples of suitable fire instruction notices are given in Annex J.

If it is necessary for flats and maisonettes to be occupied before building works are completed it is essential that all escape routes from occupied dwellings are finished before occupation and are kept free from any building materials or equipment.

H.2 Fire doors and escape routes

Escape routes which consist of stairs, corridors, balconies etc., are safe routes for the occupants to move to a recognized safe place outdoors. To keep these routes safe it is essential that the fire doors are not wedged open and the self-closing mechanisms are well maintained. Nothing should be stored along the escape routes as this can stop people from using them and can itself be a source of fire.

Unless provided with a hold-open system, in which case they should be returned to the closed position each night, fire doors which subdivide corridors should continue to have a "fire door keep closed" warning notice on them reminding people to keep the fire doors closed.

The maintenance of fire doors should be carried out in accordance with the manufacturer's recommendations.

H.3 Provision of smoke control

Smoke control is essential to allow people to escape from a building. Smoke control restricts the spread of smoke and stops it from endangering escape routes. At least one of the following smoke control arrangements should be used:

a) openings that are automatically operated by smoke detectors at the time of a fire;

b) automatically operated systems designed to create a pressure differential so that smoke is restricted from entering escape routes;

c) corridors or circulation spaces subdivided by fire doors to restrict smoke filling an entire escape route;

d) smoke extraction systems.

Mechanical devices such as those in items a) and b) should be inspected and tested in accordance with a planned maintenance programme in order that any failures can be identified and corrected as soon as possible (see Annex L).

NOTE Openable windows on the escape routes allow the fire service to release smoke from a building and are not intended to be opened by people escaping from the building.

Ancillary accommodation may be provided with permanent ventilation to allow smoke to escape without affecting dwellings or escape routes from dwellings.

H.4 Engineering services and fire service facilities

Any alterations, additions, repairs, or modifications to services and equipment should be carried out only by competent persons.

Services that assist escape (in addition to those described in **H.2** and **H.3**) include stairway and corridor lighting with independent or secondary sources of electricity supply, and duplicate lighting systems. These should be periodically inspected to make sure that they are working effectively and that switches are adequately labelled to indicate which circuits they control.

Fire detection and alarm systems together with any associated door control mechanisms which they control should be regularly inspected and tested (see Annex L).

One or more of the passenger lifts in the building may be made available for the exclusive use of fire-fighters in an emergency, when a switch at fire service access level (usually the entrance level) marked "Fire-fighting lift" is operated. Any lift that is designated as a fire-fighting lift should receive early attention when it breaks down. Regular inspections of the fire-fighting lift switch should be made to check for any unauthorized use.

Wet or dry rising fire mains and the inlet and/or outlet boxes that go with them, together with any foam inlets to oil-fired boilers, should be regularly inspected for damage and repaired if necessary. Where provided, outlet straps to fire mains should be checked to see that they are in place and secure.

Fire service access roads and gates leading to the building can become seriously obstructed by the indiscriminate parking of cars and other vehicles using the site. Control and enforcement of parking restrictions can prove difficult, but the provision and maintenance of notices giving clear instructions regarding parking arrangements can go some way to alleviating this problem.

H.5 Portable fire-fighting equipment

Where small bore hose reels and portable fire extinguishers are installed they should be maintained and tested in accordance with BS 5306-1 or BS EN 671 for hose reels and BS 5306-3 for portable fire extinguishers.

The introduction of any new building services can present an additional fire risk and suitable additional portable fire equipment should be provided.

As the residents of sheltered housing cannot be expected to use manual fire-fighting equipment, its provision should be restricted to higher fire risk areas such as communal kitchens, and wardens' accommodation.

H.6 Sheltered housing

Individual dwelling entrance doors should be provided with smoke seals, as this will provide a high degree of protection against the smoke contamination of any dwelling adjacent to one on fire.

An automatic fire detection and alarm system should be installed in order that the fire service can be alerted at an early stage of the development of a fire. It is preferable for the fire alarm devices to sound only in the zone in which the fire has been detected (as well as at the main control panel, at all repeater panels and at any central receiving station).

A log should be kept of any residents who would require assistance in a fire situation in order to evacuate their dwelling and/or the building, and the fire service should be made aware of the log and its location. The log might form part of the fire safety manual (see Clause **6** and Annex A).

Occupants of sheltered housing should be instructed that:

a) in the event of discovering a fire, they should not attempt to tackle it, but should activate the nearest manual call point (should a smoke detector not have already activated the automatic fire alarm system) and then proceed to the nearest safe telephone and call the fire service. They should not look for the warden, nor wait for the warden (or alarm receiving station) to contact them. They should then proceed to the nominated place of safety;

b) in the event of a fire being discovered by someone else, they should remain in their own dwelling and await instructions from the warden or fire service, unless otherwise instructed by the warden or a member of the fire service.

H.7 Furniture in communal areas in sheltered housing

All furniture in communal areas should conform to the medium hazard resistance to ignition classification specified in BS 7176.

All curtains in communal areas should meet the performance requirements for classification as type B or type C when tested in accordance with BS 5867-2:1980.

Annex I (informative)
Advice to occupiers of domestic residential buildings

I.1 General

This annex contains information regarding fire safety advice that can be given to occupiers of flats, maisonettes and other domestic residential buildings. In general the same information applies to both occupiers of flats and maisonettes, and occupiers of houses. Where the information differs, the difference is highlighted in the text.

The fire service can generally provide additional advice on fire safety if it is felt to be necessary.

Examples of suitable fire instruction notices (see **12.2**) are given in Annex J.

I.2 Smoke alarms

The longer a fire burns before it is discovered, the more likely it is to cause death or injury. A fire that starts smouldering at night is therefore very dangerous.

People are not always awoken by the smell of smoke. A fire involving modern furnishings can produce poisonous gases that prevent people from recovering consciousness. Even when people do awake, their means of exit can be blocked by thick choking smoke.

Installing smoke alarms in a dwelling does not stop fires starting and does not put a fire out, but if properly installed and looked after they can give an early warning of fire and increase the chances of escape.

Guidance on the selection and installation of smoke alarms can be obtained from local fire services.

I.3 Ways in which fires can start

Fires in domestic buildings can start in many ways, including:

— careless use of matches, candles, cigarettes and pipes;

— careless use of cookers, especially leaving chip pans without watching them;

— drying and airing of clothes and other items that could burn near heaters such as gas fires and electric radiant, storage and convector heaters;

— no fire guards to prevent objects from falling into an open fire;

— children playing with matches and cigarette lighters;

— old or faulty domestic appliances, including electric blankets;

— putting portable heaters close to furniture and curtains;

— not taking out the plugs from electrical appliances at night or when away from home, unless they are designed for continuous operation, e.g. refrigerators, video recorders, clocks, etc.;

— use of paraffin heaters;

— covering of storage and convector heaters thus preventing air from getting to them;

— irregular or poor servicing of heating appliances.

I.4 Heating

Most dwellings, including flats and maisonettes, are provided with a fixed heating system. The risk of a fire occurring can be reduced if the fixed heating system is used rather than heaters, as all types of portable heaters can start a fire if they are not properly sited, used correctly and maintained in good working order.

The entrance hall of a house, or the entrance lobby and corridor of a flat or maisonette, is the normal escape route in the event of a fire, so it is essential that portable radiant heaters are not used in these areas. It is not advisable to use paraffin heaters. Special care needs to be taken with portable bottle gas heaters, particularly when changing cylinders. The manufacturer's instructions for all portable heaters include guidance on where they should be placed, how they should be used and how they can be kept in safe working order.

I.5 Doors

Self-closing doors are provided in flats and maisonettes, and in houses of three storeys and above, to stop the spread of fire and smoke. It is most important that they are not wedged open and that the self-closing mechanism works correctly.

If self-closing doors do not close themselves, occupants of flats and maisonettes can report the defect to the porter, caretaker or landlord, or to the local housing authority. Occupants of houses can either report the defect to the landlord, if the house is rented, or arrange the repair themselves.

It can help to prevent the spread of fire if occupants close tightly as many doors as possible before going to bed or when leaving the premises empty.

I.6 Abuse of fire-fighting equipment (flats and maisonettes only)

Fire-fighting equipment (in the form of fire extinguishers, fire mains and outlets) and fire safety signs are installed in flats and maisonettes. It is the responsibility of all occupants to ensure that such equipment is not interfered with, and if any item of equipment is found apparently damaged, to report it immediately.

I.7 Access roads

It is important that fire service access roads to houses and to blocks of flats and/or maisonettes are kept clear and unobstructed, to allow access by the fire service and other emergency vehicles at all times. It is the responsibility of all occupants to ensure that they do not park their cars in these roads or allow their visitors to do so, and if they see any vehicles parked there, to report it.

Annex J (informative)
Examples of fire instruction notices

J.1 General

The fire instruction notice provides instructions on fire precautions and actions to take in the event of a fire. This annex gives examples of fire instruction notices for:

— flats and maisonettes (**J.2**);

— other residential buildings (**J.3**);

— shops, offices, industrial, storage and other similar buildings (**J.4**).

J.2 Flats and maisonettes

An example of a suitable fire instruction notice for flats and maisonettes is shown in Figure J.1.

J.3 Other residential buildings

An example of a suitable fire instruction notice for other residential buildings is shown in Figure J.2.

J.4 Shops, offices, industrial, storage and other similar buildings

An example of a suitable fire instruction notice for buildings provided with a single-stage alarm system is shown in Figure J.3. An example of a suitable fire instruction notice for buildings provided with a two-stage alarm system is shown in Figure J.4.

This building has been built in such a way as to protect the people in it if a fire breaks out. The important thing to remember is that if the fire starts in your home, it is up to you to make sure that you can get out of it.

AT ALL TIMES

— Make sure that the smoke alarms in your home are working.

— Do not store anything in your hall or corridor, especially anything that will burn easily.

— Use the fixed heating system fitted in your home. If this is not possible, only use a convector heater in your hall or corridor. Do not use any form of radiant heater there, especially one with either a flame (gas or paraffin) or a radiant element (electric bar fire).

— Do not store things in the cupboard(s) where your gas and electricity meters are fitted.

— Do not block access roads to the building.

IF A FIRE BREAKS OUT IN YOUR HOME

— If you are in the room where the fire is, leave straight away, together with anybody else, then close the door.

— Do not stay behind to try to put the fire out.

— Tell everybody else in your home about the fire and get everybody to leave. Close the front door and leave the building.

— Do not use the lift.

— Do not use a balcony unless it is part of the escape route from the building.

— CALL THE FIRE BRIGADE.

IF YOU SEE OR HEAR OF A FIRE IN ANOTHER PART OF THE BUILDING

— It will usually be safe for you to stay in your own home.

— You must leave your home if smoke or heat affects it. Close all doors and windows.

CALLING THE FIRE BRIGADE

The fire brigade should always be called to a fire, even if it only seems a small fire. This should be done straight away.

The way to call the fire brigade is by telephone as follows.

1) Dial 999 from a land-line or 112 from a mobile phone.

2) When the operator answers give the telephone number you are ringing from and ask for FIRE.

3) When the fire brigade reply tell them clearly the address where the fire is.

4) Do not replace the receiver until the fire brigade have repeated the address to you and you are sure they have got it right. The fire brigade cannot help if they do not have the full address.

Figure J.1 — Example of a fire instruction notice for use in flats and maisonettes

If a fire starts in your home, it is up to you to make sure that you can get out of it.

Do not wait until a fire happens. Read these instructions and find out the best way for you and your family to get out of your home and also out of the building if a fire started somewhere else. There may be more than one way out. If you and all the other people in the house follow these rules you will all be much safer and less likely to start a fire or be injured in one.

AT ALL TIMES

— Make sure that the smoke alarms in your home are working.

— Do not store anything in your hall or corridor, especially anything that will burn easily.

— Use the fixed heating system fitted in your home. If this is not possible, only use a convector heater in your hall or corridor. Do not use any form of radiant heater there, especially one with either a flame (gas or paraffin) or a radiant element (electric bar fire).

— Do not store things in the cupboard(s) where your gas and electricity meters are fitted.

— Do not block access roads to the building.

IF A FIRE BREAKS OUT IN YOUR HOME

— If you are in the room where the fire is, leave straight away, together with anybody else, then close the door.

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— Tell everybody else in your home about the fire and get everybody to leave. Close the front door and leave the building.

— Do not use the lift.

— Do not use a balcony unless it is part of the escape route from the building.

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1) Dial 999 from a land-line or 112 from a mobile phone.

2) When the operator answers give the telephone number you are ringing from and ask for FIRE.

3) When the fire brigade reply tell them clearly the address where the fire is.

4) Do not replace the receiver until the fire brigade have repeated the address to you and you are sure they have got it right. The fire brigade cannot help if they do not have the full address.

Figure J.2 — Example of a fire instruction notice for use in other residential buildings

IF YOU DISCOVER A FIRE

a) Operate the fire alarm immediately.

b) Call the fire brigade.

c) Attack the fire if possible with the equipment provided, but do not take any personal risks.

d) Leave immediately if the fire cannot be brought quickly under control. Shut doors and windows to slow down the spread of smoke, but only if it will not significantly delay your escape.

ON HEARING THE ALARM

— Leave the building and proceed to the assembly point at ……

— Use the nearest available exit.

— Do not use the lifts.

— Only collect small valuables and a coat if they are close.

— Do not stop to collect other personal belongings.

— Take your friends or family members with you.

— Do not re-enter the building until instructed that it is safe to do so.

Figure J.3 — Example of a fire instruction notice for use in buildings provided with a single-stage alarm system

IF YOU DISCOVER A FIRE

a) Operate the fire alarm immediately.

b) Attack the fire if possible with the equipment provided, but do not take any personal risks.

c) Leave immediately if the fire cannot be brought quickly under control. Shut doors and windows to slow down the spread of smoke but only if it will not significantly delay your escape.

ON HEARING THE ALARM

— The "alert" signal is a series of short signals on the alarm which may be interspaced with a voice message.

— Remain at your workplace but be prepared to leave if necessary.

— Await further instructions, either by the public address system or from the floor fire marshal.

NOTE Disabled people and assisting companions should move immediately to the designated location upon hearing the alert signal (and voice message).

— If the "alert" signal sounds outside the normal working hours, leave the building immediately. The normal working hours for this building are …… (e.g. Monday to Friday 0900 – 1800 hours).

— The "general alarm" is a continuous sounding of the alarm, which may be interspaced with a voice message.

— On hearing this, leave the building and proceed to the assembly point at ……

— Use the nearest available exit.

— Do not use the lifts.

— Only collect small valuables and a coat if they are close.

— Do not stop to collect other personal belongings.

— Take your friends or family members with you.

— Do not re-enter the building until instructed that it is safe to do so.

Figure J.4 — Example of a fire instruction notice for use in buildings provided with a two-stage alarm system

Annex K (normative)
Audience/crowd control

NOTE Attention is drawn to the fact that there is a legal requirement to obtain a licence for the majority of public functions.

K.1 Audience/crowd control at public functions

K.1.1 *General*

Certain functions, e.g. pop concerts, can present additional risks, largely from the effects of over-excitement and irrational behaviour. These dangers are further exacerbated if overcrowding is permitted. Steps should be taken on such occasions to reduce the dangers and minimize the risk.

At the planning stage, the number and the width of exits should be determined by calculating the number of persons any room or storey is capable of holding. Generally the calculation involves dividing the area, in square metres, by a predetermined occupancy load factor applicable for the use to which the premises are to be put.

The conditions of any licence normally specify the maximum number of persons to be accommodated. This is the number, derived by calculation, for which the exits from the premises are intended to cater in the event of an emergency. Any appreciable increase in this number puts all occupants at risk.

K.1.2 *Before admitting the public*

NOTE 1 Experiences of fires in places of assembly have highlighted the importance of ensuring that exit doors can be easily and immediately opened, that exit routes are free from obstruction and adequately lit and that combustible waste has been removed.

Before the public are admitted to any performance or function, the fire safety manager should ensure that:

a) all necessary fire safety features are available and in effective working order;

b) all exit doors are unlocked and readily available for use;

c) all chains, wedges or other removable fastenings are removed from exit doors and hung in their storage positions;

d) all emergency fastenings are working effectively;

e) any doors, gates or shutters that are required to be locked in the open position are so locked;

f) all exit routes and exit doors (both internally and externally) are free from obstruction;

g) fire doors are not wedged or propped open;

h) exit routes and exit signs are adequately illuminated and, where two power supplies are provided, e.g. mains and battery, both are operative;

i) there are no obvious fire hazards, such as accumulated waste;

NOTE 2 Particular care should be taken if contractors have been working on the premises.

j) the appropriate number of staff/attendants, including those trained to assist disabled people, are present (see **K.1.3**);

k) any equipment provided to assist the evacuation of disabled people, including evacuation lifts, evacuation chairs and vibrating pagers, is operative.

K.1.3 *During and after admitting the public*

While members of the public are being admitted:

a) in licensed premises, the fire safety manager should ensure that the number of persons admitted does not exceed that specified by the terms of the licence;

b) in unlicensed premises, the fire safety manager should ensure that the number of persons admitted does not exceed that for which means of escape is provided and for which the premises are designed.

There should be a sufficient number of competent and adequately trained staff available throughout the event to deal with any emergency situation and to assist, where necessary, in evacuation of the premises.

At the start of any function such as a pop concert, either the manager or some other competent person should make a public announcement specifically explaining the fire routine. In particular, the means of raising the alarm and the location of exits should be explained.

After all members of the public have left the building, it should be inspected to ensure that there are no smouldering fires or other potential fire risks.

K.2 Crowd control in complexes

Certain times, such as immediately before and after Christmas in a retail complex, can present additional dangers if overcrowding is permitted. Steps need to be taken on such occasions to reduce the dangers and minimize the risk.

In particular:

a) controls and checks should be in place to ensure that overcrowding does not take place;

b) there should be a sufficient number of competent and adequately trained staff available to deal with any emergency situation and to assist, where necessary, in the evacuation of the complex. This might entail training additional staff;

c) an “active” public address system should be used regularly as a principal means of reducing crowd congestion and coordinating evacuations in shops.

Annex L (normative)
Routine inspection and maintenance of fire safety installations

L.1 General

NOTE Fire safety installations comprise the items and elements of which examples are listed in Annex C.

It is essential for the safety of the occupants of a building that fire safety equipment (including passive fire protection provisions) is inspected frequently. Although much of the inspection can be undertaken by suitably trained personnel, a formal agreement should be made with the installer or the installer's representative to provide the regular inspection and testing described in the relevant British Standards for individual fire safety installations.

Unless temporary alternative fire safety systems can be put in place, it might be appropriate for certain of the inspections carried out at three-monthly or longer intervals to be done outside normal working hours.

L.2 Daily inspections

L.2.1 *General*

The checks described in **L.2.2**, **L.2.3**, **L.2.4**, **L.2.5** and **L.2.6** should be undertaken daily. For premises with defined opening times such as shops, theatres and cinemas, these checks should be undertaken prior to members of the public entering the building.

L.2.2 *Fire detection and alarm systems*

All fire detection and alarm systems should be inspected daily. In particular, it should be ensured that:

a) the control panel indicates normal operation or, if any fault is indicated, that it has been logged and the appropriate action(s) taken;

b) any fault recorded the previous day has received attention.

L.2.3 *Emergency and escape lighting systems*

All emergency and escape lighting systems should be inspected daily. In particular, it should be ensured that:

a) every lamp is lit if the system is maintained;

b) the control panel for any central battery system or generator indicates normal operation;

c) any fault found is logged and the appropriate action(s) taken.

L.2.4 *Sprinkler systems*

All sprinkler systems should be inspected daily. In particular, it should be ensured that:

a) unless the connection to the fire service is automatically monitored continuously, there is continuity of the connections between the alarm switch and the control unit and between the control unit and the fire service (usually via a remote manned centre);

b) unless automatically controlled, the water level and air pressure are correct in any pressure tank that provides a duplicate supply;

c) any necessary corrective action(s) are taken.

L.2.5 *Fire door automatic release mechanisms*

All doors that are held open by automatic release mechanisms should be released daily.

L.2.6 *Portable fire extinguishers and hose reels*

All points should be inspected daily at which portable fire extinguishers or hose reels are usually located. Missing fire extinguishers or hose reels should be replaced immediately. Any extinguisher used in a fire or for training, or otherwise discharged, should be recharged immediately. Damaged extinguishers or hose reels should be repaired or replaced.

L.3 Weekly

L.3.1 *General*

In addition to the checks recommended in **L.2**, the checks described in **L.3.2** to **L.3.7** should be undertaken once a week.

L.3.2 *Fire detection and alarm systems*

All fire detection and alarm systems should be inspected weekly. In particular, it should be ensured that:

a) the control equipment is able to receive a fire signal and to initiate the evacuation procedure, recording which trigger device has been used, in accordance with BS 5839-1;

b) any standby batteries are in good condition and the fuel, oil and coolant levels of any standby generators are correct, topping up as necessary;

c) the reserves of paper and ink or ribbon for any printer are adequate for two weeks' normal usage.

L.3.3 *Sprinkler systems*

All sprinkler systems should be inspected weekly. In particular, it should be ensured that:

a) water and air pressure gauge readings on installations, trunk mains and pressure tanks, and water levels in elevated private reservoirs, rivers, canals, lakes, water storage tanks etc., meet the design criteria and all gauge readings and levels are recorded;

b) each water motor alarm has been sounded for at least 30 s;

c) automatic pumps start when the water pressure is reduced to the specified level;

d) for automatic pumps powered by a diesel engine:

1) the fuel and oil levels of the engine meet the design and/or manufacturer's specification;

2) the oil pressure, the flow of cooling water through open-circuit cooling systems or the water level in the primary circuit of closed-circuit cooling systems all meet the design and/or manufacturer's specification;

3) the engine restarts using the manual start test button;

e) the electrolyte level and density of all lead acid Plante cells meet the design and/or manufacturer's specification. If the density is low the battery charger should be checked for efficient operation and, if the charger is working correctly, the affected cells should be replaced;

f) the mode monitoring system for stop valves in life safety installations is operating correctly;

g) there is continuity of connection between the alarm switch and the control unit and between the control unit and the fire service (usually via a remote manned centre) for automatically monitored connections;

h) trace heating systems provided to prevent freezing in the sprinkler system are functioning correctly.

L.3.4 *Gaseous, foam and powder extinguishing systems*

All gaseous, foam and powder extinguishing systems should be inspected weekly. In particular, it should be ensured that:

a) any pressure gauges are functioning correctly;

b) all operating controls are both properly set and accessible;

c) all indicators are functioning correctly;

d) the equipment, particularly pipework and nozzles, is free from dust and dirt, is not physically damaged nor leaking, and remains in its designed position;

e) the fire risk and its enclosure have not changed;

f) the quantity of extinguishing medium is correct and, for foam systems, the water supply is available and at the correct pressure.

L.3.5 *Smoke control systems for means of escape*

Actuation of the system should be simulated once a week. It should be ensured that any fans and powered exhaust ventilators operate correctly, smoke dampers close (or open in some systems), natural exhaust ventilators open, automatic smoke curtains move into position, etc.

L.3.6 *Evacuation lifts and fire-fighting lift installations*

The operation of the evacuation and fire-fighting lift switches should be tested once a week and should be repaired or replaced if found to be faulty.

L.3.7 *Fire hydrants*

All fire hydrants should be inspected once a week. In particular, it should be ensured that there are no obstructions impeding access, that the indicator plates are in position, and that the isolating valves are locked open.

L.4 Monthly

L.4.1 *General*

In addition to the checks recommended in **L.2** and **L.3**, the checks described in **L.4.2** to **L.4.8** should be undertaken once a month.

L.4.2 *Fire detection and alarm systems*

Any standby generator should be started up once a month by simulating failure of the normal power supply, and allowed to energize the system for at least 1 h, while the system is monitored for any malfunctioning caused by the use of the generator. After restoring the normal supply, the charging arrangements for the generator starting battery should be tested, and the appropriate action should be taken if they are found not to be functioning correctly. In addition, the oil and coolant levels should be topped up and the fuel tanks filled.

L.4.3 *Emergency and escape lighting systems*

A failure of the supply to the normal lighting should be simulated once a month, during which all luminaires and exit signs should be inspected to determine whether they are functioning correctly. If the standby supply is from a generator with back-up batteries, a test should be carried out to determine whether all luminaires and exit signs function correctly even if the generator is prevented from starting. Any luminaires or exit signs that do not function correctly should be repaired or replaced.

After restoring the supply to the normal lighting, it should be ensured that:

a) indicator lamps or devices to self-contained luminaires or internally illuminated exit signs show that the normal supply has been restored;

b) indicator lamps or devices to central battery systems show that the normal supply has been restored, and that the charging arrangements are functioning correctly;

c) the charging arrangements for any battery for starting a generator are functioning correctly;

d) the oil and coolant levels are topped up and the fuel tanks filled.

L.4.4 *Gaseous, foam and powder extinguishing systems*

A monthly check should be carried out to ensure that all personnel who might have to operate the equipment or system(s) are properly trained and authorized to do so, and in particular that new employees have been instructed in their use.

L.4.5 *Evacuation lifts and fire-fighting lift installations*

A failure of the primary power supply should be simulated once a month. If a generator provides the standby power supply, it should energize the lift(s) for at least 1 h.

L.4.6 *Hose reels*

Hose reels should be visually inspected once a month. In particular, it should be ensured that there are no leaks and that drum assemblies are free to rotate on their spindles.

L.4.7 *Automatic opening doors*

The operation of fail-safe mechanisms should be tested once a month, either by "breaking-out" the doorset or by simulating failure of the mains power supply, as appropriate. The results of the test should be recorded. Any doors that are found to be faulty should be repaired or replaced.

L.4.8 *Doors on hold-open devices*

The operation of hold-open devices should be tested once a month by simulating failure of the mains power supply or operation of the fire alarm system. The results of the test should be recorded. Any doors that are found to be faulty should be repaired or replaced.

L.5 Three-monthly

In addition to the checks recommended in **L.2**, **L.3** and **L.4**, the actuation of all smoke control systems should be simulated once every three months. All zones should be separately tested and it should be ensured that any fans and powered exhaust ventilators operate correctly, smoke dampers close (or open in some systems), etc.

L.6 Six-monthly

L.6.1 *General*

In addition to the checks recommended in **L.2**, **L.3**, **L.4** and **L.5**, the checks described in **L.6.2** and **L.6.3** should be undertaken once every six months.

Arrangements should be made for six-monthly inspections and tests to be carried out by competent persons on the fire detection and alarm systems, the sprinkler systems, any extinguishing systems, the emergency and escape lighting systems and the fire-fighting lift, for any defects found to be logged and the necessary action taken, and for certificates of testing to be obtained.

L.6.2 *Fire doors*

All fire doors should be inspected every six months. In particular, it should be ensured that:

a) heat-activated seals and smoke seals are undamaged;

b) door leaves are not structurally damaged or excessively bowed or deformed;

c) gaps between the door leaf and the frame are not so small as to be likely to bind, or so large as to prevent effective fire and smoke-sealing;

d) hanging devices, securing devices, self-closing devices and automatic release mechanisms are operating correctly.

L.6.3 *Fire mains*

All fire mains should be inspected every six months. In particular, it should be ensured that:

a) inlets, landing valves, drain valves, door hinges and locking arrangements for inlet and landing valve boxes are ready for immediate use, and spindles, glands and washers are in a satisfactory condition;

b) for wet mains:

1) booster pumps and their associated mechanical and electrical apparatus are functioning correctly;

2) storage tanks are full of clean water.

L.7 Yearly

In addition to the checks recommended in **L.2**, **L.3**, **L.4**, **L.5** and **L.6**, arrangements should be made for annual inspections and tests of the following to be carried out by competent persons, for any defects to be logged and the necessary action taken, and for certificates of testing to be obtained:

a) fire detection and alarm systems;

b) self-contained luminaires with sealed batteries, if more than three years old;

c) sprinkler and drencher systems;

d) smoke ventilators and smoke control systems;

e) evacuation lifts for disabled people;

f) fire-fighting lift installations;

g) fire hydrants;

h) fire mains;

i) portable fire extinguishers;

j) hose reels.

Stocks of foam concentrate or solution should be checked annually and replenished as necessary.

NOTE Attention is drawn to the testing and inspection requirements of BS 7671.

Annex M (normative)
Routine inspection and maintenance of ventilation and air conditioning ductwork

M.1 Inspection and maintenance

Maintenance of air conditioning and ventilating equipment, including air filters, motors, fire dampers and their controls, smoke detectors and alarms, is of paramount importance both in preventing fire and in ensuring that measures taken to mitigate its consequences are effective when needed.

Before any works of maintenance are carried out the extent of any fire hazards involved, and the potential effect of any fire on the occupants or operation of the building, should be assessed. Appropriate precautionary measures should be taken where necessary, e.g. temporarily relocating occupants who might be put at risk in the event of a fire, and it is essential that fire escape routes are kept unobstructed. All reasonable precautions should be taken to avoid the outbreak of fire. Smoking should be prohibited in ducts and maintenance workers should be instructed to observe "No Smoking" rules applicable to other areas of the building. Portable fire extinguishers should be readily available.

As filters, etc. become contaminated they become a progressively greater fire hazard, and hence it is essential that they are cleaned and/or replaced as recommended by the manufacturer or supplier. Similarly, it is essential that deposits of combustible material (including any dust) are not allowed to build up within the ductwork itself. Panels forming ceiling voids used for the extraction of air from non-domestic kitchens and from deep fat fryers need frequent cleansing to avoid the build-up of grease deposits. The provision of access panels facilitates such cleansing, other maintenance, and also fire-fighting.

Arrangements should be made for all fire dampers to be tested by a competent person on completion of the installation and at regular intervals not exceeding two years, and to be repaired or replaced immediately if found to be faulty. Spring-operated fire dampers should be tested annually and fire dampers situated in dust-laden and similar atmospheres should be tested much more frequently, at periods suited to the degree of pollution.

Arrangements should be made for periodic maintenance of any smoke detector system used to operate fire dampers and for such system(s) to be tested by a competent person after installation to determine whether detection occurs at the appropriate design smoke density. Any smoke detector system that is found to be faulty should be either repaired or replaced immediately.

M.2 Fire service access to ductwork

Problems have been encountered where fire-fighting personnel have been unable to gain easy access to ductwork at intermediate levels between the input and output ends of the system, and this has lead to extensive cutting and/or dismantling operations to fight a fire within ductwork systems. Routine checks should be made to ensure that access panels for fire-fighting access purposes are provided, that the panels are removable without the need for tools or specialist equipment and that all such panels can be accessed without difficulty.

M.3 Records

A system of records is an essential part of a successful maintenance policy.

NOTE BS 5720 contains guidance on maintenance records, but is currently proposed for withdrawal by BSI Technical Committee RHE/23.

Maintenance should be planned and scheduled, and maintenance procedures should be standardized.

The central system of records should include a complete inventory of the system, giving complete information on all equipment, components, distribution networks, electrical apparatus, controls and wiring. In particular the records should include the specification and location of fire dampers and cavity barriers, and the positions of all fire compartment boundaries and all cavity barriers should be marked on the installation drawings.

A certificate of completion should be obtained.

In buildings with extensive ductwork systems, it can be advisable for plans to be kept on the premises that show the installed system, fire-fighting access panels, firemen's control, siting of fire dampers, and plant room access and layout. The provision of such plans, especially if displayed or readily available, can be of great assistance not only to fire service personnel but also to maintenance engineers working on the system.

Copies of all records should be added to the fire safety manual (see Clause **6** and Annex A).

M.4 Housekeeping

Metal ductwork can conduct sufficient heat from a fire inside the ductwork, or on the fire side of a fire damper, to ignite adjacent combustible materials. It is therefore essential that a separation of at least 500 mm is maintained between uninsulated ductwork and combustible goods, packaging, partitioning, etc. Signs conforming to BS 5499 should be provided to warn of the need to maintain a clear zone around the ductwork.

Annex N (normative)
Phased evacuation

N.1 Fire marshals/fire wardens

A senior fire marshal should be appointed with overall responsibility for fire safety in the building during a phased evacuation. A deputy senior fire marshal/fire warden should also be appointed.

In addition, fully trained fire marshals/fire wardens are needed to be responsible for maintaining calm and discipline in an emergency. Each storey should have one fire marshal for each exit on that storey.

Actions to be taken by fire marshals/fire wardens are detailed in **N.3**.

N.2 Evacuation guidelines

To achieve a safe and orderly evacuation:

a) a prominent notice should be displayed in the fire control centre (see Annex B) indicating that the building incorporates phased evacuation;

b) the fire alarm system should remain in the phased evacuation mode both during and outside normal working hours, but should incorporate a facility to enable total simultaneous evacuation of the building during periods outside normal working hours;

c) a manual system of phased evacuation should be used where more than three phases of evacuation (including the initial phase) are required;

NOTE 1 Either a manual or an automatic system for phased evacuation is satisfactory where not more than three phases of evacuation (including the initial phase) are required.

d) where a manual system of phased evacuation is used:

— the fire control centre should be permanently staffed during normal working hours by a competent person;

— the initial phase of the evacuation (i.e. evacuation of the fire floor and floor immediately above) should be carried out automatically;

— the time periods between evacuation phases should be governed by information received from the fire marshals/fire wardens, but should not exceed the maximum time needed to evacuate two storeys simultaneously.

e) where an automatic system is used for phased evacuation, the time periods between evacuation phases should allow for simultaneous evacuation of two storeys;

NOTE 2 An example of messages for use with phased evacuation and a suggested sequence of tones and messages and time lapse between each element are given in Annex P.

f) if progressive evacuation is necessary, the normal sequence of evacuation should be:

1) the floor of origin of the fire and the floor immediately above;

2) the next two floors above;

3) the remaining floors in groups of two working up the building;

4) floors in groups of two below the floor of origin working downwards.

NOTE 3 This sequence might need to be changed to reflect the fire situation.

The evacuation of all disabled people in the building should normally commence on the sounding of the initial alert.

All floors below ground level should be treated as one zone for evacuation purposes. Except where a fire occurs below ground level, this zone should either be the last one to be evacuated, or be evacuated simultaneously with the ground floor.

N.3 Fire evacuation procedures

N.3.1 *Action to be taken by senior fire marshal and deputy senior fire marshal*

The following instructions for action in the event of a fire should be issued to the senior fire marshal and deputy senior fire marshal.

a) During normal office hours:

1) on the actuation of the fire alarm, proceed to the fire control centre;

2) ensure that the fire service has been called and someone has been detailed to meet the fire service on arrival;

3) confirm that initial evacuation is taking place;

4) ensure that the management plan for the evacuation of disabled people is proceeding;

5) await information from floor fire marshals/fire wardens;

6) by the use of the public address system or fire telephone system, give the building occupants information relating to the alarm;

7) carry out necessary evacuations using the agreed plan unless information from the fire marshal indicates that the fire is under control and no further evacuation is necessary;

8) on the arrival of the fire service, give all available information to the senior fire officer.

b) Outside normal office hours:

1) on the actuation of the fire alarm, report to the fire control point;

2) switch the fire alarm system to total evacuation mode;

3) ensure that the fire service has been called;

4) on the arrival of the fire service, give all available information to the senior fire officer.

N.3.2 ***Action to be taken by fire marshals/fire wardens***

The following instructions for action in the event of a fire should be issued to the fire marshals/fire wardens.

a) During normal hours:

1) if the "alert" signal sounds on your floor:

i) evacuate disabled people using the agreed procedure;

ii) await information by public address system or fire telephone system;

iii) reassure other staff and discourage them from leaving the floor at the sound of the "alert" signal;

iv) on instructions from the public address system or fire telephone system, initiate evacuation;

v) ensure that floor evacuation is complete;

vi) leave the building and report to the assembly point at ……;

2) if the general alarm sounds on your floor:

i) ensure that floor evacuation is complete and report this to the fire control centre via the fire telephone;

ii) if the fire is located on your floor, attack the fire with the equipment provided if possible, but do not take any personal risks. Report the fire situation to the fire control centre via the fire telephone;

iii) leave the building and proceed to the assembly point at ……;

b) Outside normal office hours (if a fire marshal is available):

1) if the "alert" signal or general alarm sounds:

i) ensure that floor evacuation is complete;

ii) if the fire is located on your floor, attack the fire with the equipment provided if possible, but do not take any personal risks. Report the fire situation to the fire control centre via the fire telephone;

iii) leave the building and proceed to the assembly point at ……

Annex O (informative)
Examples of evacuation strategies

O.1 Buildings provided with evacuation lifts

O.1.1 *Structural protection*

The evacuation strategy in buildings provided with evacuation lifts depends on the type of structural protection available in the building. There are three options:

a) protected lobbies used as refuges — each lift and stairway is protected from fire in the accommodation by two fire doors and may be used from any level;

b) storeys divided into two refuges — the wall separating the two fire compartments is needed to ensure a safe route between the lift lobby and the storey exit; each compartment also acts as a refuge from the other in the event of a fire;

c) single-stair building — the accommodation on each floor comprises a single fire compartment; the lift and stairway is protected from fire in the accommodation by two fire doors and may be used from any level.

O.1.2 *Evacuation sequence*

A typical evacuation sequence in a building provided with an evacuation lift is as follows.

a) Disabled people move to the lift lobby to await the lift.

b) The designated lift operator collects disabled people and takes them to the final exit level.

c) If the lift lobby becomes untenable before the lift arrives:

1) the disabled people move to positions outside the door to the stairway in a compartment not yet affected by the fire, to await assistance in moving to a lower floor;

2) the disabled people await the lift at a lower level, or if the lift has failed or is unsafe to use, progressive movement is continued down the stairway towards the final exit level.

O.1.3 *Communications*

In a typical evacuation, the following communication procedures are carried out.

a) The alarm is sounded before evacuation commences.

b) Any necessary information about disabled people requiring evacuation is passed to the person controlling the evacuation.

O.2 Buildings without evacuation lifts

A typical evacuation sequence in a building without an evacuation lift is as follows.

a) On hearing the alarm, disabled people move to the nearest refuge.

b) The designated competent person, after completing their evacuation/search procedure, proceeds to the refuge.

c) The disabled people are assisted down the stairway towards the final exit level.

Annex P (informative)
Example messages for use in a phased evacuation

P.1 Alert messages

An example of alert messages is as follows.

a) *First sequence:*

May I have your attention please.
May I have your attention please.
A fire has been reported in the building.
While this report is being investigated please remain at your work place.
Further information will follow shortly.

b) *Second sequence:*

May I have your attention please.
May I have your attention please.
You are reminded to remain at your work place whilst the fire alert exists.

P.2 Evacuation message

An example of an evacuation message is as follows.

May I have your attention please.

May I have your attention please.

A fire has been reported in the building.

Please leave the building by the nearest exit.

Please leave the building immediately by the nearest exit.

Please do not use the lifts since they may be needed.

Do not use the lifts but leave the building by the nearest stair.

P.3 Test message

An example of a test message is as follows.

May I have your attention please.

May I have your attention please.

The public address and fire alarm systems are about to be tested.

The fire alert signal will sound first followed by the fire evacuation signal.

Please take no further action.

Signal — sound alert.

Signal — sound evacuate.

The test is now complete.

If you had difficulty in clearly hearing messages or fire alarm signals please advise the fire control centre.

Thank you for your cooperation.

A suggested sequence of tones, messages and time lapse between each element for automatic broadcast is detailed in **P.4**.

P.4 Alert messages, signals and timings

Suggested alert messages, signals and timings (in seconds) are as follows.

a) *First sequence:*

— alert tone: 10 s [intermittent (1 ± 0.5) s on and (1 ± 0.5) s off];
— silence: 5 s;
— alert message (first sequence) [see **P.1**a)];
— silence: 5 s;
— alert tone: 10 s [intermittent (1 ± 0.5) s on and (1 ± 0.5) s off];
— silence: 5 s;
— alert message (first sequence).

b) *Second sequence:*

— after 3 min, broadcast second sequence alert message [see **P.1**b)];
— continue to repeat this message at 3 min intervals.

P.5 Evacuation messages, signals and timings

Suggested evacuation messages, signals and timings are as follows:

— evacuate tone: 10 s;
— silence: 5 s;
— evacuation message (see **P.2**);
— silence: 5 s;
— evacuate tone: 10 s;
— silence: 5 s;
— evacuation message.

Continue to repeat this message.

Annex Q (normative)
Operational information (emergency packs) for the fire service

Emergency packs should provide operational information needed by fire crews at the time of an incident, in a simple and useable format. Where appropriate they should include the following information:

a) fire service contingency plan for the building (this is usually provided by the fire service);

b) simple floor plan layouts, indicating any relevant fire resistance provisions, internal access provisions, fire-fighting facilities, building services and any specific hazards;

c) any relevant information (including operating instructions) relating to equipment/fixed installations provided for means of escape or fire-fighting;

d) the implications of any fire-engineering strategy on the performance of the building during a fire, e.g. reduced fire resistance of elements of structure or areas of the building with additional fire protection measures;

e) information relevant to preventing environmental damage;

f) information relevant to mitigating loss and assisting salvage operations.

Depending on the complexity of the building, schematic fire system plans might also be necessary. An isometric or cut-away view might be appropriate as the best means of illustrating the building. Fire protection facilities shown on any of these plans should be labelled, and where plan symbols are used, a key to the symbols should be provided.

Additional information may also be placed in the emergency pack, e.g. CD-ROMs containing the full fire safety plan, business recovery plans or business continuity plans, but it is essential to ensure that it is clearly distinguished from the basic operational information.

Emergency packs kept on the premises should be sited such that they are readily accessible to attending fire crews. Emergency packs are often sited on the outside of the building in plans boxes, but if site security is an issue, the boxes may be sited internally on the predetermined fire service access route into the building. For a large site and/or where a 24 h site presence is maintained, it can be acceptable for the emergency packs to be sited within a security office or fire control room. Where plans boxes are sited externally, they should be in a prominent position, preferably protected against all weather conditions.

Where a plans box is used, a photo-luminescent identification sign should be provided on the outer face of the box door. This should remain prominent so that if the building's lighting fails, the sign will clearly indicate the location of the box. Where a plans box is not used, the emergency pack should be clearly identified by an appropriate method.

Annex R (normative)
Hot work

The fire safety manager should be satisfied that both the person issuing a hot work permit and the person(s) to whom the permit is being issued understand and are able to carry out their individual responsibilities, which should be detailed in the written hot work procedure. If the work is to be carried out by contractors, they should be made fully aware of pertinent fire and safety rules for the building.

A hot work permit should only be issued:

— if the fire safety manager is satisfied that an adequate fire risk assessment and method statement have been prepared;

— by those competent and authorized to do so;

— when preparation work is complete and necessary precautions are in place; and

— if the hot work is to be carried out by those competent in the particular activity.

The hazards and necessary precautions should be identified through a fire risk assessment, which should include inspection of the work area prior to issue of the permit. Issues that should be taken into account when preparing for, during and after hot work include, but are not limited to, the following:

— whether the item to be worked on can be removed to a safe area;

— consideration of other people, other activities or other hazards etc. in the work area;

— preparation of the place of work, including removal or protection of combustible or flammable materials to prevent their ignition, which can include those on the other sides of partitions, walls, etc.;

— provision of and training in the operation of suitable fire extinguishers (see BS 5306-8) and other fire precautions as specified on the hot work permit. Ideally a separate "standby person", who is not involved in carrying out the hot work, should be available to use the fire-fighting equipment;

— availability of a safety officer (if appropriate);

— particular precautions for specific work situations, e.g. overhead or confined space working;

— particular precautions where the premises, plant or equipment present special risks;

— ensuring safety during the work by following the agreed method statement and conditions of the hot work permit;

— leaving the workplace clean and safe, e.g. removal of hot work equipment and ensuring that there is no smouldering etc;

— checking the area after the job is completed, including a final check at a later time (at least 60 min) and certainly prior to the premises being vacated.

NOTE 1 Guidance on the control and permission of hot work is given in the Fire Protection Association publication *Hot work permit scheme* [17] (see also Note 2 to **16.1**).

NOTE 2 Where dangerous substances, as defined by the Dangerous Substances and Explosive Atmospheres Regulations 2002 [18], are or have been present, particular procedures are required. These are discussed in Health and Safety Executive publication L 137 [19].

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