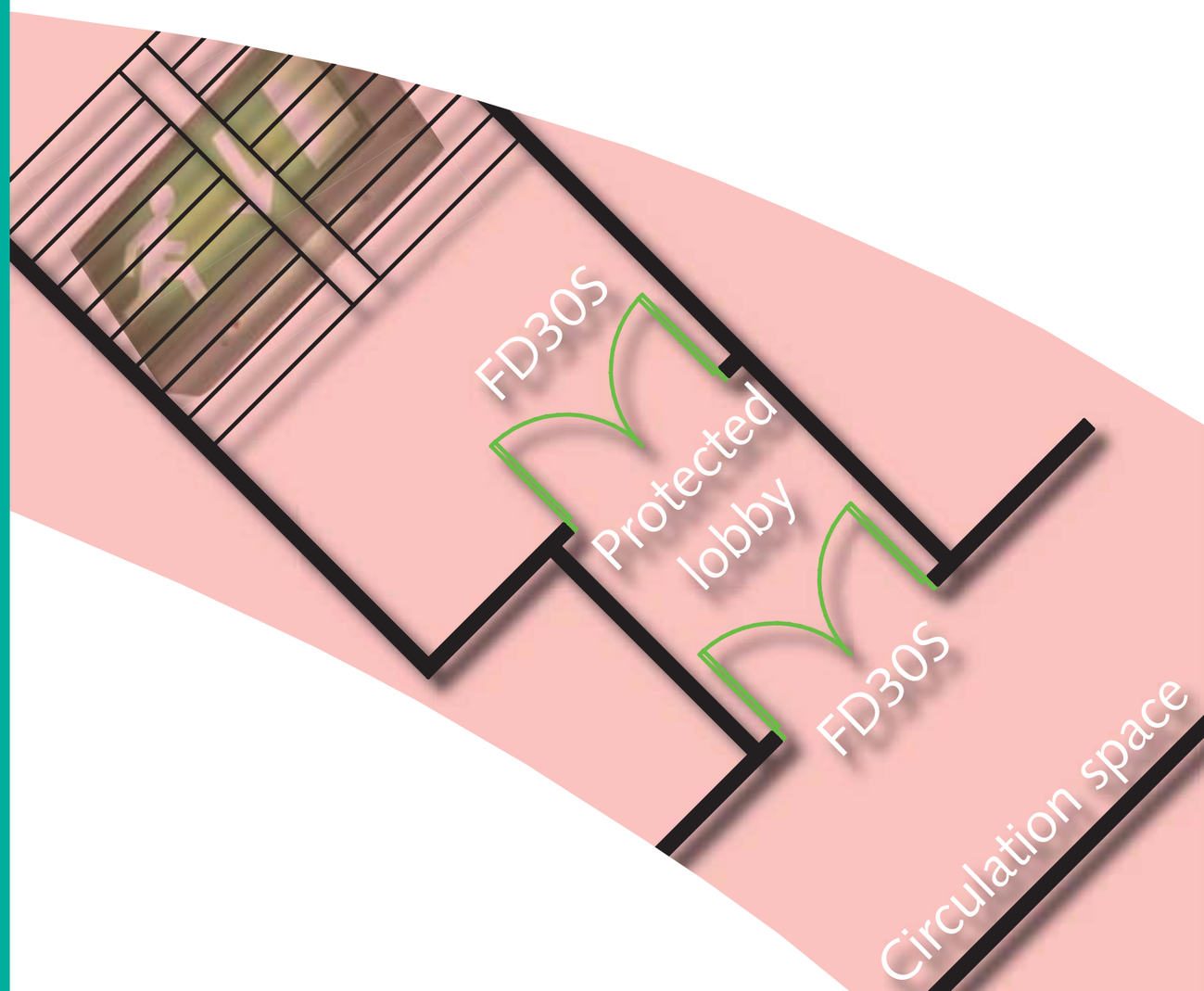
DH Department of Health

Firecode – fire safety in the NHS

Health Technical Memorandum 05-02: Guidance in support of functional provisions for healthcare premises



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ISBN 978-0-11-322767-9
9 780113 227679

DH INFORMATION READER BOX

Policy	**Estates**
HR / Workforce	Performance
Management	IM & T
Planning	Finance
Clinical	Partnership Working

Document Purpose	Best Practice Guidance		
ROCR Ref:		**Gateway Ref:**	7572
Title	HTM 05-02: Guidance to support functional provisions in healthcare premises		
Author	Department of Health - Estates & Facilities Division		
Publication Date	January 2007		
Target Audience	PCT CEs, NHS Trust CEs, SHA CEs, Care Trust CEs, Foundation Trust CEs , Directors of Finance, Directors of Estates & Facilities, Trust Fire Safety Advisers, SHA Estates Advisers		
Circulation List	Fire & Rescue Services, Building Control Bodies, Architects, Designers		
Description	HTM 05-02 sets out healthcare specific measures to meet functional requirements of Part B (Fire Safety) to the Building Regulations 2000 for all healthcare buildings.		
Cross Ref	N/A		
Superseded Docs	HTM 81 and HTM 85		
Action Required	Use as guidance for achieving compliance with Part B (Fire Safety) of the Building Regulations		
Timing	**N/A**		
Contact Details	Paul Roberts DH Estates & Facilities Division Quarry House Quarry Hill, Leeds LS2 7UE 0113 254 6881		
For Recipient's Use			

Firecode – fire safety in the NHS
Health Technical Memorandum 05-02: Guidance in support of functional provisions for healthcare premises

London: The Stationery Office

Published by TSO (The Stationery Office) and available from:

Online
www.tsoshop.co.uk

Mail, Telephone, Fax & E-mail
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PO Box 29, Norwich NR3 1GN
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Fax orders 0870 600 5533
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71 Lothian Road, Edinburgh EH3 9AZ
0870 606 5566 Fax 0870 606 5588

TSO@Blackwell and other Accredited Agents

ISBN 978-0-11-322767-9

First published 2007

Printed in the United Kingdom for The Stationery Office

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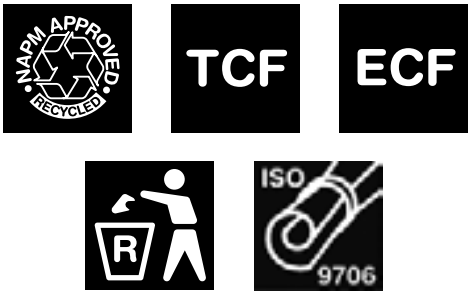


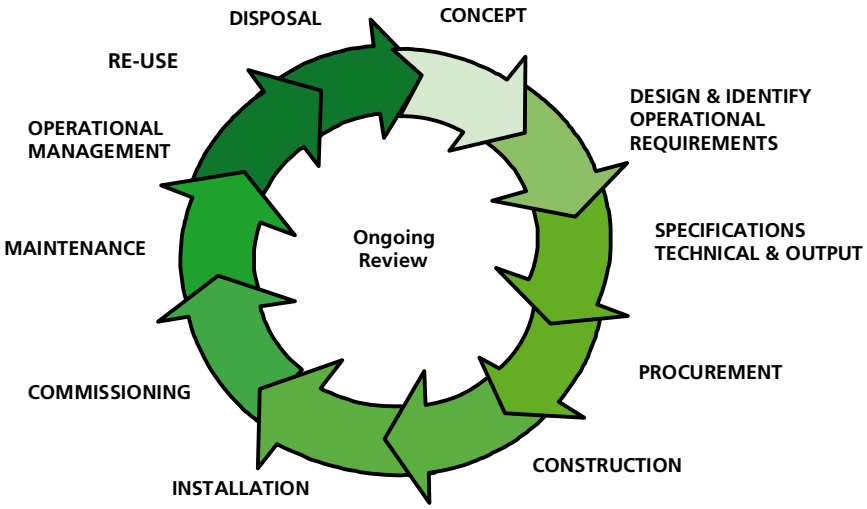
Preface

About Health Technical Memoranda

Engineering Health Technical Memoranda (HTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare.

The focus of HTM guidance remains on healthcare-specific elements of standards, policies and up-to-date established best practice. They are applicable to new and existing sites, and are for use at various stages during the whole building lifecycle:

Figure 1 Healthcare building life-cycle



Healthcare providers have a duty of care to ensure that appropriate engineering governance arrangements are in place and are managed effectively. The Engineering Health Technical Memorandum series provides best practice engineering standards and policy to enable management of this duty of care.

It is not the intention within this suite of documents to unnecessarily repeat international or European standards, industry standards or UK Government legislation. Where appropriate, these will be referenced.

Healthcare-specific technical engineering guidance is a vital tool in the safe and efficient operation of healthcare facilities. Health Technical Memorandum guidance is the main source of specific healthcare-related guidance for estates and facilities professionals.

The core suite of nine subject areas provides access to guidance which:

- is more streamlined and accessible;
- encapsulates the latest standards and best practice in healthcare engineering;
- provides a structured reference for healthcare engineering.

Structure of the Health Technical Memorandum suite

The series of engineering-specific guidance contains a suite of nine core subjects:

Health Technical Memorandum 00
: Policies and principles (applicable to all Health Technical Memoranda in this series)

Health Technical Memorandum 01
: Decontamination

Health Technical Memorandum 02
: Medical gases

Health Technical Memorandum 03
Heating and ventilation systems

Health Technical Memorandum 04
Water systems

Health Technical Memorandum 05
Fire safety

Health Technical Memorandum 06
Electrical services

Health Technical Memorandum 07
Environment and sustainability

Health Technical Memorandum 08
Specialist services

Some subject areas may be further developed into topics shown as -01, -02 etc and further referenced into Parts A, B etc.

Example: Health Technical Memorandum 06-02 Part A will represent:

Electrical Services – Electrical safety guidance for low voltage systems

In a similar way Health Technical Memorandum 07-02 will simply represent:

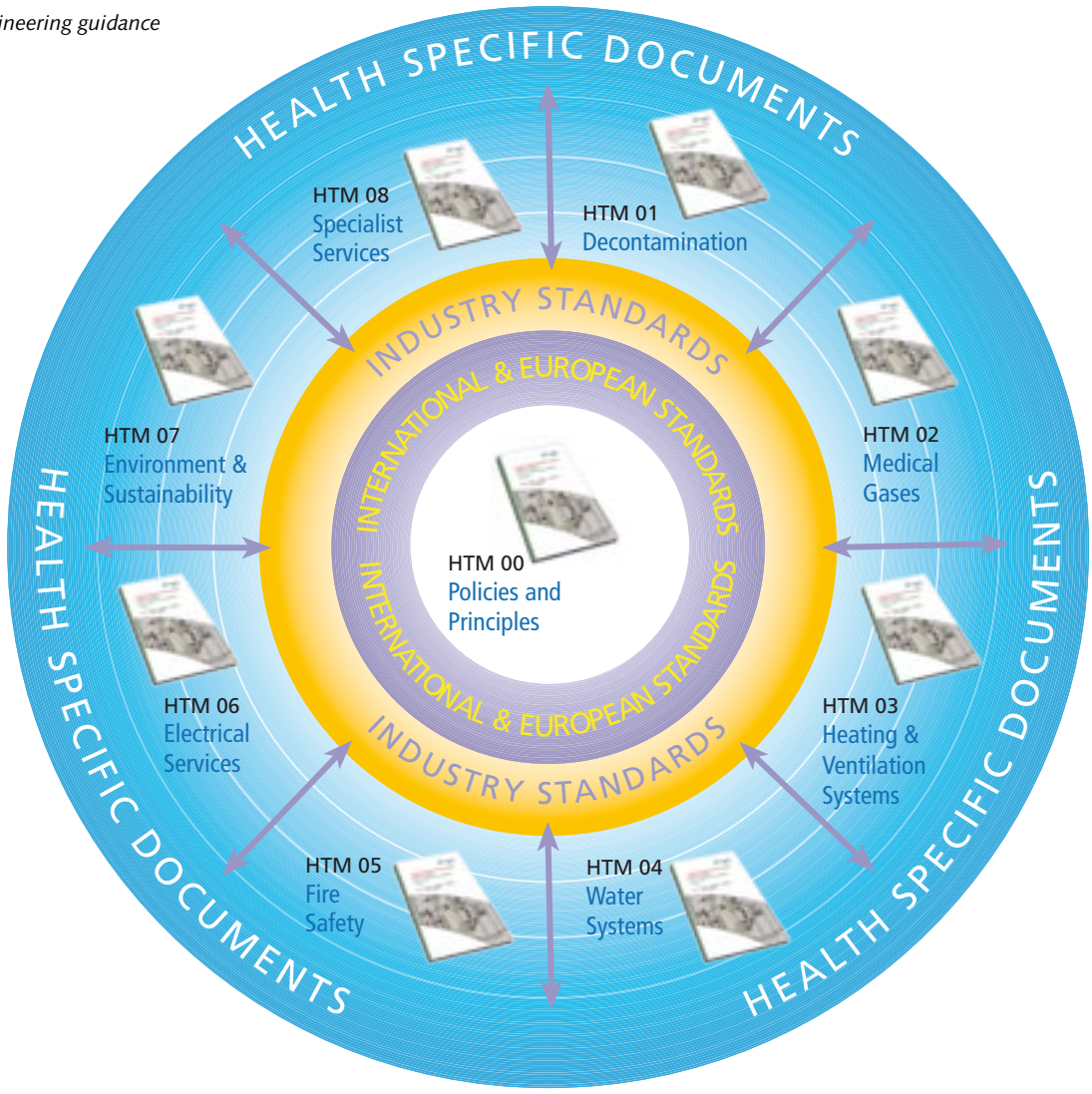
Environment and Sustainability – EnCO_2de.

All Health Technical Memoranda are supported by the initial document Health Technical Memorandum 00 which embraces the management and operational policies from previous documents and explores risk management issues.

Some variation in style and structure is reflected by the topic and approach of the different review working groups.

DH Estates and Facilities Division wishes to acknowledge the contribution made by professional bodies, engineering consultants, healthcare specialists and NHS staff who have contributed to the review.

Figure 2 Engineering guidance



Executive summary

This Health Technical Memorandum takes the form of best practice guidance and recommendations. It should not be quoted as if it were a specification, and any claims of compliance should be carefully examined to ensure they are not misleading.

This Health Technical Memorandum provides guidance on the design of fire precautions in new healthcare buildings and major extensions to existing healthcare buildings. It supersedes Health Technical Memorandum 81 – 'Fire precautions in new hospitals', Health Technical Memorandum 85 – 'Fire precautions in existing hospitals', and 'Fire risk assessment in Nucleus hospitals'.

Health Technical Memorandum 05-02 has been prepared by a working group of the Department of Health National Fire Policy Advisory Group (NFPAG).

This document provides guidance to achieve a satisfactory standard of fire safety. The guidance should be read as a complete package for the measures to be effective. Text in shaded boxes provides essential recommendations to ensure a minimum standard to meet the functional requirement in respect of healthcare premises. Any user of this Health Technical Memorandum is expected to be able to justify any course of action that deviates from the recommendations, including the using of alternative solutions.

Compliance with this Health Technical Memorandum cannot confer immunity from legal obligations. Attention is drawn to legal requirements in respect of planning and approval, and to the need to consult with appropriate bodies, which might include building control bodies and the fire-and-rescue authorities.

Health Technical Memorandum 05-02 is a code of practice which recognises the special requirements of fire precautions in the design of healthcare premises and should allow the current statutory regulations to be applied sensibly within a framework of understanding.

This guidance recognises the interaction between physical fire precautions, the dependency of the patient, the fire hazards within the healthcare premises, the management policies, and the availability of sufficient and adequately trained staff in achieving an acceptable level of fire safety within healthcare premises. Users are responsible for ensuring the correct application of this Health Technical Memorandum.

The guidance in this Health Technical Memorandum satisfies all the requirements of Part B – 'Fire safety' of the Building Regulations 2000 (as amended).

The primary remit of NHS organisations with regard to fire safety is the safety of patients, visitors and staff. For all premises under their control, NHS organisations will need to select and effectively implement a series of measures to achieve an acceptable level of fire safety, taking into account:

- the guidance in this Health Technical Memorandum;
- the relevant guidance contained in other parts of Firecode;
- all relevant legislation and statutes;
- the advice and approval of local building control and fire authorities.

Contents

1 Introduction and scope

General application

1.1 This Health Technical Memorandum provides a framework of core fire safety measures. It supersedes Health Technical Memorandum 81 – 'Fire precautions in new hospitals', Health Technical Memorandum 85 – 'Fire precautions in existing hospitals', and 'Fire risk assessment in Nucleus hospitals'. It comes into effect from April 2007.

1.2 It should be used in the design of:

a. new healthcare buildings;

b. new extensions to existing healthcare buildings;

c. alterations to existing healthcare buildings;

d. change of use of an existing building into a healthcare building;

e. those parts of existing healthcare buildings which are used as a means of escape from a new extension.

1.3 It applies to the full range of premises used for the provision of treatment and care. It is therefore the starting point for fire precautions in all healthcare buildings, and where appropriate, this document directs the user to Approved Document B of the Building Regulations.

Note

Risk assessments undertaken in compliance with the Regulatory Reform (Fire Safety) Order 2005 should also be considered in determining the suitability of applying this document.

Scope of this guidance

1.4 The central purpose of this document is to provide guidance on the standards of fire safety expected in healthcare premises. To that end, the following functional provisions are expected to be met:

Means of warning and escape

B1. The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times.

Performance
The design and construction of the premises should ensure that, at all material times, patients, visitors and staff have appropriate means of escape to enable them to move to a place of temporary safety inside the healthcare premises on the same level, from where further escape is possible, ultimately to a place of safety outside the building or in remote premises.

Internal fire spread (linings)

B2 – (1) To inhibit the spread of fire within the building, the internal linings shall –

(a) adequately resist the spread of flame over their surfaces; and

(b) have, if ignited, either a rate of heat release or a rate of fire growth which is reasonable in the circumstances.

(2) In this paragraph "internal linings" means the materials or products used in lining any partition, wall, ceiling or other internal structure.

Performance
The design and construction of the healthcare premises shall inhibit the spread of fire and smoke within the building via the surface finishes.

Internal fire spread (structure)

B3 – (1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.

(2) A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings. For the purposes of this subparagraph a house in a terrace and a semi-detached house are each to be treated as a separate building.

(3) Where reasonably necessary to inhibit the spread of fire within the building, appropriate measures shall be taken, to an extent appropriate to the size and intended use of the building, comprising either or both of the following:

(a) subdivision of the building with fire-resisting construction;

(b) installation of suitable automatic fire suppression systems;

(4) The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.

Performance
The design and construction of healthcare premises shall inhibit the spread of fire and smoke within the building via the structure.

External fire spread

B4 – (1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.

(2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.

Access and facilities for the fire service

B5 – (1) The building shall be designed and constructed so as to provide reasonable facilities to assist fire-fighters in the protection of life.

(2) Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building.

1.5 Health Technical Memorandum 05-02 should be used as guidance on fire safety in all parts of healthcare buildings including departments or areas providing ancillary services which are planned as an integral part of a healthcare building. However, in certain buildings it may be more appropriate to apply the provisions of Approved Document B of the Building Regulations rather than to follow this guidance. Examples include:

- surgeries, clinics, health centres, walk-in centres;
- buildings used purely as offices (that is, to which patients have no access);
- ambulance stations/workshops.

See also paragraphs 1.15–1.16.

Status of this guidance

1.6 Health Technical Memorandum 05-02 is a Code of Practice prepared by a working group under the direction of the Department of Health's National Fire Policy Advisory Group and has no statutory force. It is a guidance document that recognises the problems special to healthcare and allows the current statutory regulations to be applied sensibly within a framework of understanding. The measures in this document satisfy all the requirements of Part B ('Fire safety') of the Building Regulations 2000.

1.7 When using this document, it is important to recognise that it is not possible to make comprehensive recommendations covering all eventualities and it should always be borne in mind that the purpose of healthcare premises is to provide medical treatment and/or nursing care. The complex nature of healthcare buildings will sometimes require a more flexible approach to ensure that the correct balance is achieved between fire safety and the requirements for treatment and nursing care. This should be done on the basis of

professional judgement and an understanding of the nature of the problems. However, care should be taken to ensure that the safety of patients, staff and visitors is not compromised.

1.8 In the design of healthcare buildings, no reliance is placed on external rescue by the fire-and-rescue services or manipulative types of escape appliance such as chutes or portable ladders. This document has been prepared on the basis that in an emergency the occupants of any part of a healthcare building should be able to move, or be moved, to a place of relative safety with assistance from staff only.

1.9 Fire safety in healthcare is not solely about the physical fire precautions provided. Other important factors are:

a. the dependency of the patient;

b. fire hazards within the healthcare premises;

c. management policies; and

d. availability of sufficient and adequately-trained staff.

This document also considers the fire safety implications of each of these.

1.10 To further assist with these considerations, patient occupancy categories have been defined to aid designers in ensuring that the appropriate degree of fire safety measures is incorporated into the building.

1.11 For the purposes of this document, occupants are classified as independent, dependent or very high dependency (see paragraph 3.15), based upon a broad consideration of their anticipated mobility and/or dependence. The categories differentiate between the anticipated dependence of various occupants, either during an evacuation or as a consequence of the treatment they are receiving.

Non-NHS healthcare premises

1.12 This document does not distinguish between those premises operated by the NHS and those operated by the independent sector. Where the guidance in this document is followed, Part B ('Fire safety') of the Building Regulations will be satisfied.

1.13 The NHS has responsibility for the provision of healthcare in HM Prisons. The guidance contained in this document may not be appropriate for establishing appropriate fire safety measures in these establishments. It is expected that separate guidance produced by the Home Office Custody Property Unit will be applied.

1.14 Similarly, there are healthcare buildings providing secure and medium secure accommodation for people with mental health problems. The guidance contained in this document may not be wholly appropriate for establishing fire safety measures in these establishments. Fire safety provisions may need to be discussed and agreed with all relevant parties, taking account of any published guidance relating to fire safety in similar types of establishment.

Alternative solutions

1.15 The range of NHS premises providing patient care facilities is extensive, and the guidance in this document may not be appropriate for all types of building. However, it is expected that NHS clients, designers, and building control and fire authorities will exercise a degree of judgement based on a full understanding of the problem, taking into account:

- the type of care being provided;
- the mobility of the patients;
- the planned staffing levels;
- the age of the patients;
- the size of the premises.

1.16 This document describes a way of achieving an acceptable standard of fire safety within new and modified healthcare buildings, but it is recognised that there may be other ways of satisfying the functional requirements by adopting a fire safety engineering approach. A fire safety engineering approach that takes into account the total fire safety package can provide an alternative approach to fire safety. If such an approach is used, the responsibility is placed upon those promoting the alternative approach to demonstrate that the alternative satisfies the functional requirements and fire safety objectives of this document.

Construction Products Directive (Council Directive 89/106/EEC)

1.17 The Construction Products Directive (Council Directive 89/106/EEC) aims to break down technical barriers to trade in construction products by the use of a system of harmonised technical standards. Member states and public and private-sector procurers are free to set up their own

requirements on the performance of works and, therefore, products. The Directive harmonises the methods of test, the declaration of product performance values, and the method of conformity assessment. The choice of required values for the chosen intended uses is left to the regulators in each member state.

1.18 The Commission Decisions 2000/147/EC (as amended by 2003/632/EC) and 2000/367/EC (as amended by 2003/629/EC) provide for a system of Euroclasses for determining the fire behaviour of construction products in terms of their reaction to fire and fire resistance. The performance levels recommended, where appropriate in this document, are based on the recommended levels contained in these Decisions.

1.19 The harmonised technical standards cited in the Euroclass system replace the previously used British Standards. **The performances recommended in this document are those cited by the Department for Communities and Local Government in Approved Document B – 'Fire safety', which accompanies the Building Regulations 2000 (as amended).**

Use by competent persons

1.20 The guidance in this document has been prepared on the understanding that it will be used by competent persons. For the purposes of this document, a competent person is defined as "someone who has sufficient technical training and actual experience or technical and other qualities, both to understand fully the dangers involved and to undertake properly the measures referred to in this document".

Consultation

1.21 Because of the complex and changing nature of healthcare and the often conflicting requirements between fire safety and nursing care, it is essential that early consultation takes place between the design team, the client, the trust fire safety adviser and all relevant enforcing authorities. Depending on the nature of the scheme, it may also be advantageous to involve the client insurers in the consultation process.

1.22 It is not possible to provide absolute safety from fire. The guidance in this document should reduce the risk to patients, visitors and staff as far as is reasonably practicable.

Fire safety during building operations

1.23 A significant number of fires occur as result of certain building activities. The site conduct of contractors should be adequately supervised and controlled. The trust should ensure that adequate precautions against fire are in place, and should maintain regular contact with contractors to ensure that the local fire safety policy is being complied with. Further guidance can be found in the Health & Safety Executive's Construction Information Sheet (CIS) 51 – 'Construction fire safety'.

1.24 It is also important to ensure that – when new buildings are being constructed and handed over in phases – due consideration is given to fire safety after handover. There must be no conflict in the operation of the alarm and detection system between the healthcare-occupied part of the premises and the construction area. Of equal importance is the need to ensure that means of escape is readily available at all times.

Certification schemes

1.25 There are many UK product certification schemes. Such schemes certify compliance with the requirements of a recognised document which is appropriate to the purpose for which the material is used. Materials which are not certified may still conform to a relevant standard.

1.26 Many certification bodies which approve such schemes are accredited by UKAS.

1.27 **Since the fire performance of a product, component or structure is dependent upon satisfactory site installation and maintenance, independent schemes of certification and accreditation of installers and maintenance firms will offer confidence in the standard of workmanship provided.**

1.28 Schemes such as those identified above may be accepted by building control bodies as evidence of compliance. A building control body is likely to want to establish, before work commences, that the scheme is adequate for the purposes of Building Regulations.

1.29 **NHS bodies are encouraged to utilise independent certification schemes.**

2 Glossary of terms

2.1 For the purposes of this document the following terms are defined:

Air transfer grille (fire and cold smoke): a device that will allow the passage of air in normal use, but when activated will contain both cold smoke and hot gases – usually activated by heat and an electrical interface with the detection and alarm system.

Auto-suppression: mechanical methods of fire suppression which are activated automatically – such systems may include water sprinklers and CO_2 flooding systems.

Basement storey: a storey with a floor which at some point is more than 1200 mm below the highest level of ground adjacent to the outside wall.

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

Circulation space: the communication routes both within the department/management unit and giving access to other parts of the hospital, and to all necessary fire escape exits.

Class 0 surface spread of flame: the classification achieved by a material or composite product which is either:

a. composed throughout of materials of limited combustibility; or

b. a class 1 material (when tested in accordance with BS 476-7:1971 or 1987) which, when tested in accordance with BS 476-6:1981 or 1989, has a fire propagation index (I) of not more than 12 and a subindex (i1) of not more than 6.

Class 0 is not a classification identified in any British Standard test.

Compartment: a 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.

Compartment floor: a fire-resisting floor used to separate one fire compartment from another and having a minimum period of resistance of 60 minutes.

Compartment wall: a fire-resisting wall used to separate one fire compartment from another and having a minimum period of resistance of 60 minutes (or 30 minutes in single-storey buildings).

Emergency lighting: lighting provided for use when the power supply to the normal lighting fails.

Escape lighting: that part of the emergency lighting which is provided to ensure that the escape routes are illuminated at all material times.

Final exit: the termination of an escape route from a building giving direct access to a place of safety outside the building.

Fire-and-smoke damper: fire damper which, when tested in accordance with BS EN 1366-2, meets the ES classification requirements defined in BS EN 13501-3:2005 and achieves the same fire resistance in relation to integrity as the element of the building construction through which the duct passes.

Note

Intumescent fire dampers may be tested to ISO 10294-5.

Fire containment air transfer grille: a device that will allow the passage of air in normal use, but when activated will contain the passage of fire and hot smoke.

Fire damper: mechanical or intumescent device within a duct or ventilation opening which is operated automatically and is designed to prevent the passage of fire and which is capable of achieving an integrity E classification and/or an ES

classification to BS EN 13501-3:2005 when tested to BS EN 1366-2:1999.

Note

Intumescent fire dampers may be tested to ISO 10294-5.

Fire door: a 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.

Fire engineering: the application of scientific and engineering principles to the protection of people, property and the environment from fire.

Fire hazard: a set of conditions in the operation of a product or system with the potential for initiating a fire.

Fire hazard room: a room or other area which, because of its function and/or contents, presents a greater hazard of fire occurring and developing than elsewhere.

Fire resistance: the ability of an element of building construction, component or structure to fulfil, for a stated period of time, the required load-bearing capacity, fire integrity and/or thermal insulation and/or other expected duty in a standard fire resistance test.

Fire stop: a seal provided to close an imperfection of fit or design tolerance between elements or components, to restrict the passage of fire and smoke.

Healthcare building: a hospital, treatment centre, health centre, clinic, surgery, walk-in centre or other building where patients are provided with medical care by a clinician.

Height of a building (or storey): the distance from ground level at the lowest side of the building measured to the finished floor level of the top storey.

Hospital street: is a special type of compartment which connects final exits, stairway enclosures and department entrances, and serves as a fire-fighting bridgehead and a safe evacuation route for occupants to parts of the building unaffected by fire.

Material of limited combustibility: either:

a. a non-combustible material; or

b. any material of density 300 kg/m^3 or more which, when tested in accordance with BS 476-11, does not flame, and whose rise in temperature on the furnace thermocouple is not more than 20°C; or

c. any material with a non-combustible core of 8 mm thickness or more, having combustible facings (on one or both sides) not more than 0.5 mm thick; or

d. any material of density less than 300 kg/m^3 which, when tested in accordance with BS 476-11, does not flame for more than ten seconds and whose rise in temperature is not more than 35°C on the centre (specimen) thermocouple and not more than 25°C on the furnace thermocouple.

Non-combustible: any material which is capable of satisfying the performance requirements specified in BS 476-4, or any material which when tested in accordance with BS 476-11 does not flame or cause any rise in temperature on either the centre (specimen) or furnace thermocouple.

Patient-access areas: those areas of the healthcare building to which patients have reasonable access either with or without supervision.

Place of safety: a place where persons are in no danger from fire.

Progressive horizontal evacuation: evacuation of patients away from a fire into a fire-free compartment or subcompartment on the same level.

Protected shaft: a shaft which enables persons, air or objects to pass from one compartment to another, and which is enclosed with fire-resisting construction.

Refuge: a place of temporary safety within a building. This may be an adjoining compartment or subcompartment capable of holding all those threatened, without a significant change in level and from which there is potential for further escape should that become necessary.

Relevant boundary:

a. the actual boundary of the premises; or

b. the boundary of the site which the side of the building faces, and which is parallel, or at an

angle of not more than 80°, to the side of the building; or

c. the centre line of a road, railway, river or canal which adjoins the actual boundary; or

d. a notional boundary established between buildings, if two or more buildings share the same site.

Subcompartments: areas into which the building can be divided to reduce travel distance and which provide 30 minutes' resistance to fire.

Subcompartment wall: a fire-resisting wall used to separate one subcompartment from another and having a minimum period of resistance of 30 minutes.

Travel distance: the horizontal distance to be travelled by a person from any point within the floor area to the nearest adjoining compartment, subcompartment, escape stairway or external exit, having regard to the layout of walls, partitions, fittings and furniture.

Unprotected area: in relation to a side or external wall of building, this means:

a. a window, door or other opening; and

b. any part of an external wall which has a period of fire resistance less than that required for the elements of structure (integrity and load-bearing capacity only), and which provides less than 15 minutes' fire resistance (insulation); and

c. any part of the external wall which has combustible material more than 1 mm thick attached or applied to its external face, whether for cladding or any other purpose. (Combustible material in this context is a material which is neither "non-combustible" nor a "material of limited combustibility".)

3 Principles of life safety

Introduction

3.1 In healthcare buildings, particularly in patient-access areas, the immediate and total evacuation of the building in the event of fire may not be possible or desirable. Patients with restricted mobility, patients who use wheelchairs, and patients confined to bed cannot negotiate escape routes, particularly stairways, unaided. Patients under medication may require staff assistance, and patients who are dependent on electrical/mechanical equipment for their survival cannot always be disconnected and moved rapidly without serious consequences.

3.2 This document assumes that there are sufficient and adequately-trained staff on duty in the building to provide assistance with any necessary evacuation in the event of fire. However, while the total evacuation of smaller buildings accommodating occupants falling within the independent category might be practical, the evacuation of an entire hospital in the event of fire would be an enormous exercise in which patients might be placed at risk due to trauma or their medical condition.

3.3 Should evacuation become necessary, except for those premises with independent occupants, it should be based on the concept of progressive horizontal evacuation, with only those people directly at risk from the effects of fire being moved. Adopting this approach ensures that the concept of "inclusive design" has been applied.

3.4 Healthcare premises accommodating dependent and very high dependency patients are divided into a series of compartments providing one hour of fire resistance. These are further divided into subcompartments. Compartments and subcompartments should be constructed to provide 60 and 30 minutes' fire containment respectively, without adjacent areas becoming affected.

3.5 Where the evacuation involves very high dependency patients, additional consideration must be given to the distance of travel that might be necessary to reach a place of safety where essential treatment and care could be recommenced.

Fire evacuation strategy

3.6 The basic strategy for fire evacuation of dependent or very high dependency patients should be to move them on their bed or in a wheelchair, to a safer area on the same floor.

3.7 There are three main stages of evacuation:

a. Stage 1 – horizontal evacuation from the subcompartment where the fire originates to an adjoining subcompartment or compartment;

b. Stage 2 – horizontal evacuation from the entire compartment where the fire originates to an adjoining compartment on the same floor;

c. Stage 3 – vertical evacuation to a lower floor substantially remote from the floor of origin of the fire (at least two floors below), or to the outside.

3.8 There are three fire conditions when evacuation is necessary or should be considered:

a. Extreme emergency – where there is an immediate threat to safety from fire or smoke;

b. Emergency – no immediate threat, but fire or smoke likely to spread from an adjoining area;

c. Precautionary – no immediate threat to life or safety, but there is a fire on an adjoining floor or in an adjacent building.

3.9 In extreme emergency situations, the sequence of evacuation should be:

a. those in immediate danger;

b. ambulant patients;

c. the remaining patients who are not ambulant.

Progressive horizontal evacuation

3.10 The principle of progressive horizontal evacuation is that of moving occupants from an area affected

by fire through a fire-resisting barrier to an adjoining area on the same level, designed to protect the occupants from the immediate dangers of fire and smoke (a refuge). The occupants may remain there until the fire is dealt with or await further evacuation to another similar adjoining area or down the nearest stairway. This procedure should give sufficient time for non-ambulant and partially ambulant patients to be evacuated down stairways to a place of safety, should it become necessary to evacuate an entire storey.

3.11 Active fire protection systems such as detection systems, warning systems and fire suppression systems may be incorporated into the building so that the time available for escape is maximised. This feature may be most beneficial for the occupants of adjacent spaces rather than those in the space immediately affected by the fire.

3.12 Patient-access areas should be designed to allow for progressive horizontal evacuation other than in premises where patients fall into the independent category.

3.13 Areas to which patients have access should not be located on storeys where evacuation in a fire emergency would necessitate travelling up a stairway to a final exit.

Separation of patient-access areas from other parts of a hospital

3.14 In addition to the general requirement for progressive horizontal evacuation, hospitals should also be designed to minimise the possibility of fires from the non-patient-access areas affecting the patient-access areas of hospitals.

3.15 For the purposes of this document, patient-access areas are categorised, in relation to dependency, as follows:

a. **Independent:** patients will be defined as being independent:

(i) if their mobility is not impaired in any way and they are able to physically leave the premises without staff assistance; or

(ii) if they experience some mobility impairment and rely on another person to offer minimal assistance. This would include being sufficiently able to negotiate stairs unaided or with minimal assistance, as well as being able to comprehend the emergency wayfinding signage around the facility.

Where treatment would affect the ability of an independent patient to evacuate the premises promptly and unaided, the assembly group classification in Approved Document B ('Fire safety') would not be appropriate to the premises. In these circumstances, the guidance in this document should therefore be applied;

b. **Dependent:** all patients except those classified as "independent" or "very high dependency";

c. **Very high dependency:** those whose clinical treatment and/or condition creates a high dependency on staff. This will include those in critical care areas, operating theatres, coronary care etc and those for whom evacuation would prove potentially life-threatening.

See Appendix H for further information.

3.16 Non-patient-access areas, for the purposes of this document only, are divided into the following:

a. **Hazard departments:** departments/management units that contain high fire loads and/or significant ignition sources. Hazard departments should be separated by distance from any patient-access areas and should not adjoin them, either horizontally or vertically, unless additional precautions are provided;

b. **Non-hazard departments:** departments/management units that do not contain high fire load and/or significant ignition sources. Non-hazard departments may adjoin patient-access areas, either horizontally or vertically, provided they are separated from them by compartment walls and floors.

3.17 Patient-access areas should always be in different compartments from non-patient-access areas.

3.18 Departments/management units should be located in accordance with Table 1.

Staffing levels

3.19 The provision of an adequate number of staff who have received effective fire safety training is the best first line of defence against fire. This is particularly important when levels of activity in the building are reduced. The presence of trained staff who can respond quickly and effectively to any fire emergency is a vital factor in limiting the

consequences of a fire, particularly where dependent patients are involved.

3.20 It is the responsibility of management to ensure that adequate numbers of staff will always be available and to devise suitable arrangements to provide for the safe evacuation of patients in accordance with the emergency evacuation plan.

3.21 When the department/management unit is in use, there should be **a minimum of two staff present at all times**. These staff should have received training in the methods of patient evacuation appropriate to the dependency of the patients and be familiar with the evacuation procedures at their place of work.

3.22 Where the number of patients in the department/ management unit is above 30, the minimum number of staff present at all times should be increased by one member of staff for every ten (or up to ten) patients.

Table 1 Requirements for the location and fire separation of fire hazard departments in relation to patient-access areas on healthcare premises

	Patient-access area	
Hazard department	**Normal dependency**	**Very high dependency**
Atrium	Refer to BS 5588-7	Refer to BS 5588-7
Boilerhouse (main)	60+ auto suppression	N/A
Central staff change	60	60+ auto suppression
Sterile services department	60	60+ auto suppression
Central store	60+ auto suppression	N/A
Commercial enterprises	60+ auto suppression	N/A
Flammable store	60+ auto suppression	N/A
Medical records	60	60+ auto suppression
Laundry	60+ auto suppression	N/A
Local medical gas stores[1]	60+ ventilation	N/A
Main electrical switchgear	60+ auto suppression	N/A
Main kitchens	60+ auto suppression	N/A
Main stores	60+ auto suppression	N/A
Pathology	60	60+ auto suppression
Pharmaceutical (manufacturing)	60	60+ auto suppression
Refuse collection/ incineration	60+ auto suppression	N/A
Works	60+ auto suppression	N/A

Key:

"60" – May be adjacent but should always be separated by 60-minute fire-resisting construction. 60 minutes' fire resistance may be reduced under certain circumstances (for example if sprinklers are fitted (see paragraphs 5.6 and 5.8)).

"60+ auto-suppression" – Preferably separate; however, if adjacent, it should be separated by 60-minute imperforate construction together with auto-suppression in the hazard department.

"N/A" – should not be located adjacent to very high dependency departments.

Note:

1 Main medical gas stores should always be located in separate buildings. Health Technical Memorandum 02-01 – 'Medical gas pipeline systems' gives guidance. Local medical gas stores should only contain sufficient quantity for daily use.

4 Communications

Principle

4.1 The design and construction of the building should ensure that fires are detected at the earliest possible opportunity and that suitable warning is then given to the occupants and the emergency services.

4.2 The provision of adequate means for detecting a fire and raising the alarm is of vital importance. Early detection permits time for orderly evacuation and allows the fire to be tackled at an earlier stage, thus minimising the damage caused. Detection is dependent on staff observation and the automatic alarm and detection systems.

Observation

4.3 The early detection of fire by people is probably the best form of detection, and the design and layout of a building can make a positive contribution to fire safety.

4.4 In a hospital or treatment centre, the most important aspect is the number of beds/trolleys visible from the staff base, which is the base from which all staff work and where information is stored and exchanged. Although it is unlikely that the staff base will be permanently staffed, a location that provides good observation will improve the likelihood of a fire being detected at an early stage.

Alarm and detection systems

4.5 The provision of an effective fire alarm system is a vital component of the overall fire safety strategy to protect patients, staff and property from fire. Health Technical Memorandum 05-03: Part B – 'Fire detection and alarm systems' provides general principles and technical guidance on the design, specification, installation, commissioning, testing, operation and maintenance of fire alarm systems in hospitals. It should be read in conjunction with BS 5839-1 and the relevant parts of BS EN 54.

5 Means of escape

Principle

5.1 The design and construction of the building should ensure that, at all times, patients, visitors and staff can move away from a fire to a place of temporary safety inside the building on the same level, from where further escape is possible, ultimately to a place of safety outside the building.

5.2 This section provides guidance on means of escape by reference to:

a. the potential for horizontal evacuation, which is achieved by dividing the storey into compartments and subcompartments;

b. the height above ground of the treatment area;

c. travel distances and escape routes;

d. the provision of an adequate number of stairways to facilitate vertical escape;

e. emergency and escape lighting.

Progressive horizontal evacuation

5.3 The need for progressive horizontal evacuation is discussed in Chapter 3. This principle will be met if the requirements below are achieved.

Note

For a definition of ground level, see "Height of a building" in the Glossary.

Floors up to 12 m above ground level with an area of less than 1000 m²

5.4 Every level with a floor area of less than 1000 m² and which contains patient-access areas should:

a. contain no more than 30 patients;

b. be divided into a minimum of two compartments.

5.5 Where a compartment provides sleeping accommodation, the maximum number of beds in the compartment should be no more than 20.

5.6 On floors above ground-floor level where sprinklers are installed, the fire-resistance of the compartment walls required by paragraph 5.4(b) may be reduced to 30 minutes (integrity and insulation).

Floors up to 12 m above ground level with an area of more than 1000 m²

5.7 Every level up to 12 m above ground level that has a floor area of more than 1000 m² and which contains patient-access areas should be divided into a minimum of three compartments. One of these compartments may be a hospital street (see paragraphs 5.40–5.46). All compartments must be interconnecting. Unless the design incorporates a hospital street, there should be a minimum of three exits from each compartment.

5.8 In levels above ground level where sprinklers are installed, the fire resistance of the compartment walls required by paragraph 5.7 may be reduced to 30 minutes (integrity and insulation).

Floors over 12 m above ground level

5.9 Every level over 12 m above ground that contains patient-access areas should be divided into a minimum of four compartments. Where no hospital street is provided, each compartment should have a minimum area of 500 m^2; where one of the compartments is a hospital street, the area of the hospital street may be less than 500 m^2. All compartments must be interconnecting. Unless the design incorporates a hospital street, there should be a minimum of three exits from each compartment.

5.10 Where sprinklers are installed, the minimum floor area of each compartment required by paragraph 5.9 may be reduced to 350 m^2.

5.11 In a fire emergency, each compartment should be capable of accommodating, as well as its normal occupants, the designed occupancy of the most highly occupied adjoining compartment.

Exits from compartments

5.12 Exits from compartments should be by way of a circulation space only.

5.13 While it is permissible to locate clinical and some non-clinical departments adjacent to each other, the means of escape through the non-clinical area must be designed to safely accommodate the evacuation of patients (that is, escape routes should be sufficiently wide enough to accommodate beds/trolleys).

5.14 It is not permissible to evacuate any non-clinical area through a clinical area unless the route through the clinical area is via a circulation route only (that is, a corridor).

5.15 From ward bedrooms only, it is acceptable to directly escape to:

a. an adjacent ward bedroom in an adjoining compartment or subcompartment; or

b. a circulation space in an adjoining compartment or subcompartment.

(See Figure 1.)

5.16 The exits from compartments should be located so that in the event of one exit becoming unavailable, any alternative exits should be sufficiently remote from each other to ensure availability. Any fire-resisting separation providing an alternative solution for remoteness should be of imperforate construction.

5.17 The above requirements do not preclude the use of escape routes across flat roofs.

Note

It is not possible to give precise recommendations on the location of alternative exits; the aim should be to locate these as far apart as practical (at least 45°) and if possible in opposite walls. In the event of a fire, at least one exit should always be available.

Compartment/department relationships

5.18 The provision of compartments to facilitate progressive horizontal evacuation should not be looked upon only in terms of means of escape. The management responsibilities, such as the extent of the area under their control, the day-to-day management, fire drills, the management of evacuation etc will have a significant impact on the design, integrity, size and configuration of compartments.

5.19 Compartment walls should follow department boundaries.

5.20 Additional requirements for compartmentation are provided in Chapter 6.

Subcompartmentation

5.21 The maximum size of a compartment permitted by this document – although appropriate for fire containment (see paragraph 6.7) – is nevertheless considered too large if the area contains patient-access areas. In the event of a fire, a large number of patients could be overcome by the spread of fire, smoke and toxic gases. Therefore, compartments containing patient-access areas should be divided into smaller subcompartments to limit the number of patients who may be affected by a fire. Wherever possible, there should be a balance of patients between subcompartments.

5.22 A compartment should be subcompartmented if:

a. it has a floor area greater than 750 m^2; or

b. it contains departments to which more than 30 patients will have access at the same time; or

c. it contains sleeping accommodation for more than 30 patients.

Note

For out-patient departments in hospitals, the floor area may be increased to 1000 m^2 before subcompartmentation becomes necessary.

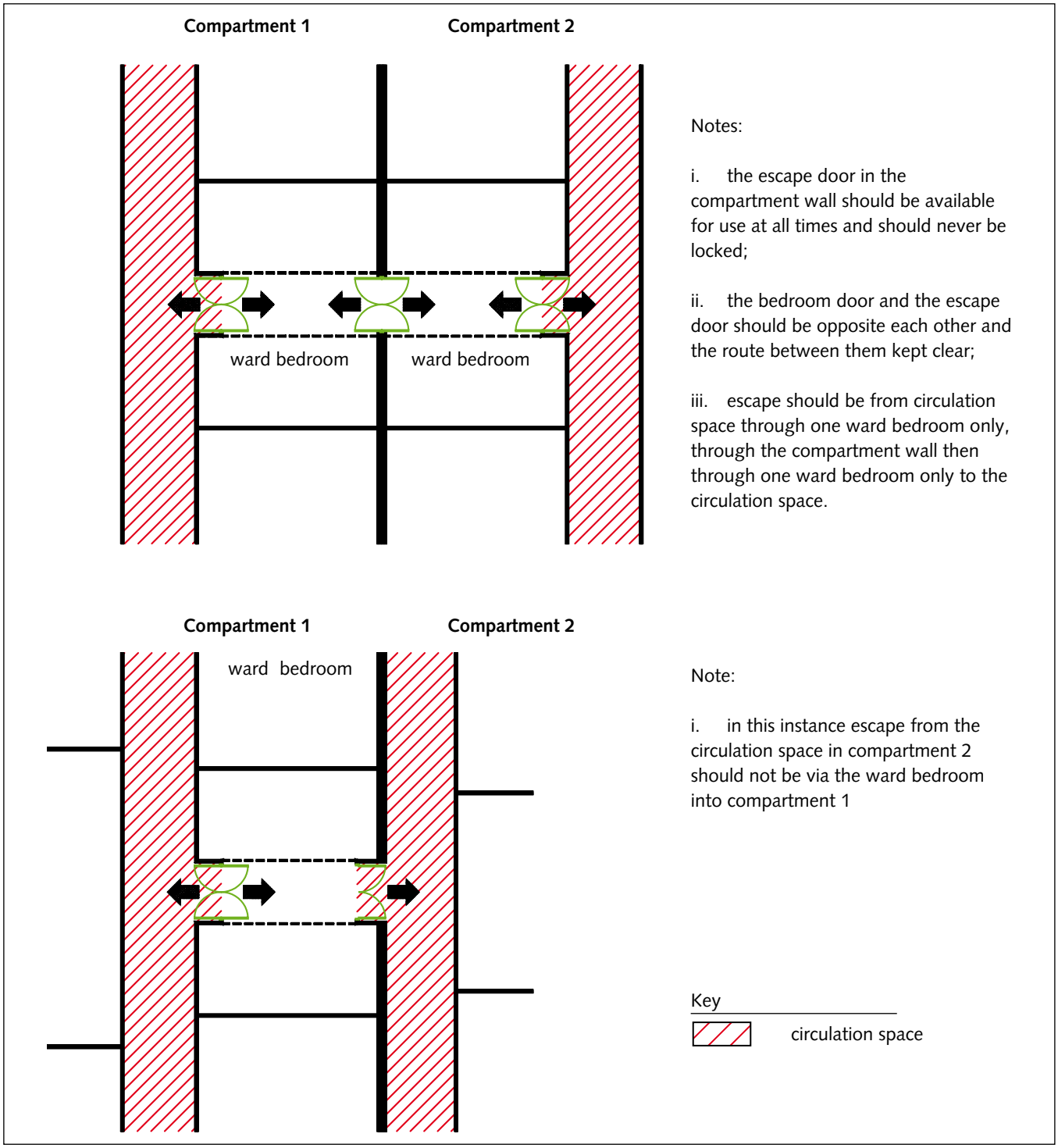
5.23 Subcompartments should be enclosed by walls having a minimum period of fire resistance of 30 minutes, which should terminate at the underside of:

a. a compartment floor; or

b. a roof; or

c. a ceiling that is non-demountable and imperforate and has a minimum period of fire

Figure 1 Escape from ward bedrooms (paragraph 5.15)



resistance of 30 minutes when tested from below in accordance with BS 476-20–22 or its BS EN replacement standard.

5.24 All openings in subcompartment walls should be protected to provide a minimum period of fire resistance of 30 minutes.

Exits from subcompartments

5.25 Each subcompartment should be provided with a minimum of two exits to adjoining but separate compartments or subcompartments.

5.26 In healthcare buildings, the left-hand arrangement illustrated in Figure 2 is not acceptable.

Openings in subcompartment walls for ductwork

5.27 Ductwork passing through subcompartment walls need not be provided with automatic fire shutters provided that:

a. the duct serves only one subcompartment; and

b. the ductwork and supports have a minimum period of fire resistance of 30 minutes (integrity only) when tested in accordance with the relevant parts of BS 476.

(See Figure 11.)

Transfer grilles

5.28 To reduce the possibility of smoke transfer between subcompartments, transfer grilles should not be provided in subcompartment walls unless they are fitted with fire-and-smoke dampers activated by thermal release set to activate at 74°C.

Glazing in subcompartment walls

5.29 Uninsulated fire-resisting glazed screens may only be provided in subcompartment walls provided they satisfy the following requirements:

a. the glazing should provide a minimum period of 30 minutes' fire resistance (integrity only);

b. the area of integrity-only glazing should be limited to a maximum of 1000 mm^2 in any room.

5.30 There is no limit on the use of glazed screens that provide a minimum period of fire resistance of 30 minutes (integrity and insulation).

5.31 Where sprinklers are fitted, there is no limit on the use of glazed screens that provide a minimum period of fire resistance of 30 minutes (integrity only), provided the glass is not of the type referred to as "modified toughened".

Travel distances

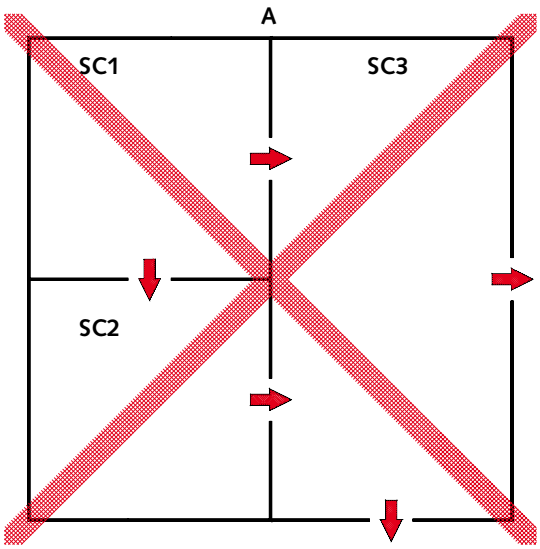
5.32 The distance to adjacent compartments, subcompartments, hospital streets, stairways and final exits should be limited to ensure that the occupants can escape from the effects of a fire within a reasonable period of time.

Single direction of escape

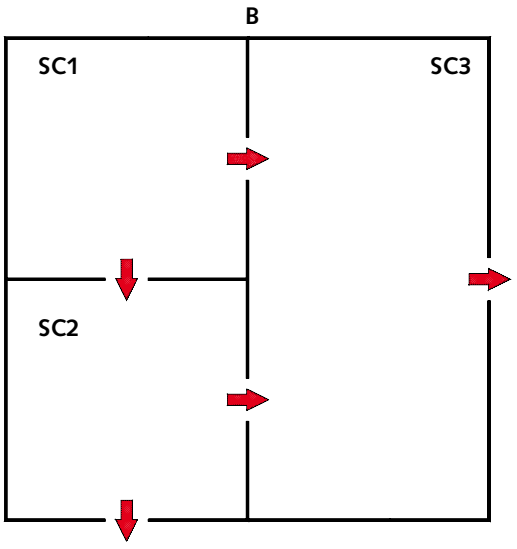
5.33 The maximum travel distance before there is a choice of escape routes should be no more than 15 m for in-patient accommodation or 18 m for all other parts of healthcare buildings.

5.34 Any part of an enclosed escape route that has single direction of escape only, and exceeds 4500 mm, should be protected by 30-minute fire-resisting

Figure 2 Exits from subcompartments



The subcompartmentation in example A is unacceptable since a fire in SC3 would block the exit from SC1 and SC2.



The subcompartmentation in example B is acceptable since a fire in any one subcompartment would not block the safe exit from others.

construction (integrity and insulation). This does not include travel within a room, but applies to "stub" corridors or a small corridor recess.

Note

There will be exceptions to these distances in certain parts of hospital buildings (for example aseptic preparation units, operating departments, linac rooms). Where these distances are exceeded, it must be justified in the fire strategy document.

5.35 Only glazing that provides a minimum period of fire resistance of 30 minutes (integrity and insulation) may be provided on circulation spaces that give a single direction of escape, provided the glass is not of the type referred to as "modified toughened". Where a sprinkler system is installed, there is no requirement for insulation.

5.36 Escape from an inner room via an access room is permitted provided the access room is not a fire hazard room.

Total travel distance

5.37 The maximum travel distance from any point within a compartment should be no more than 60 m to:

a. each of two adjoining compartments; or

b. an adjoining compartment and to a stairway or final exit.

(See Figure 3.)

5.38 The maximum travel distance from any point within a subcompartment should be no more than 30 m to:

a. an adjoining compartment or subcompartment; or

b. a stairway or final exit.

(See Figure 4.)

Note

For non-patient-access areas, the travel distance can be extended to 45 m.

Figure 3 Travel distance within a compartment (paragraph 5.37)

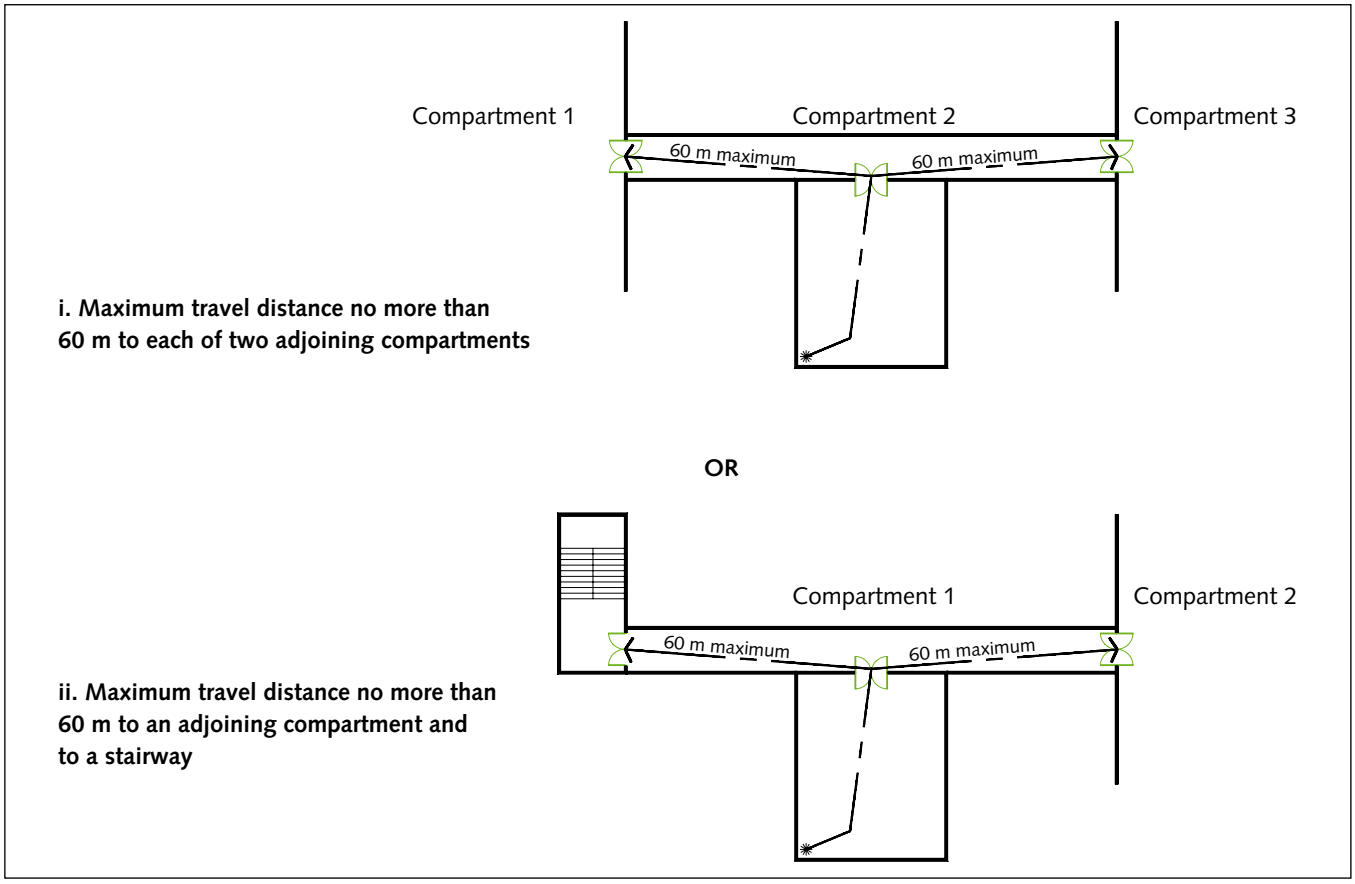
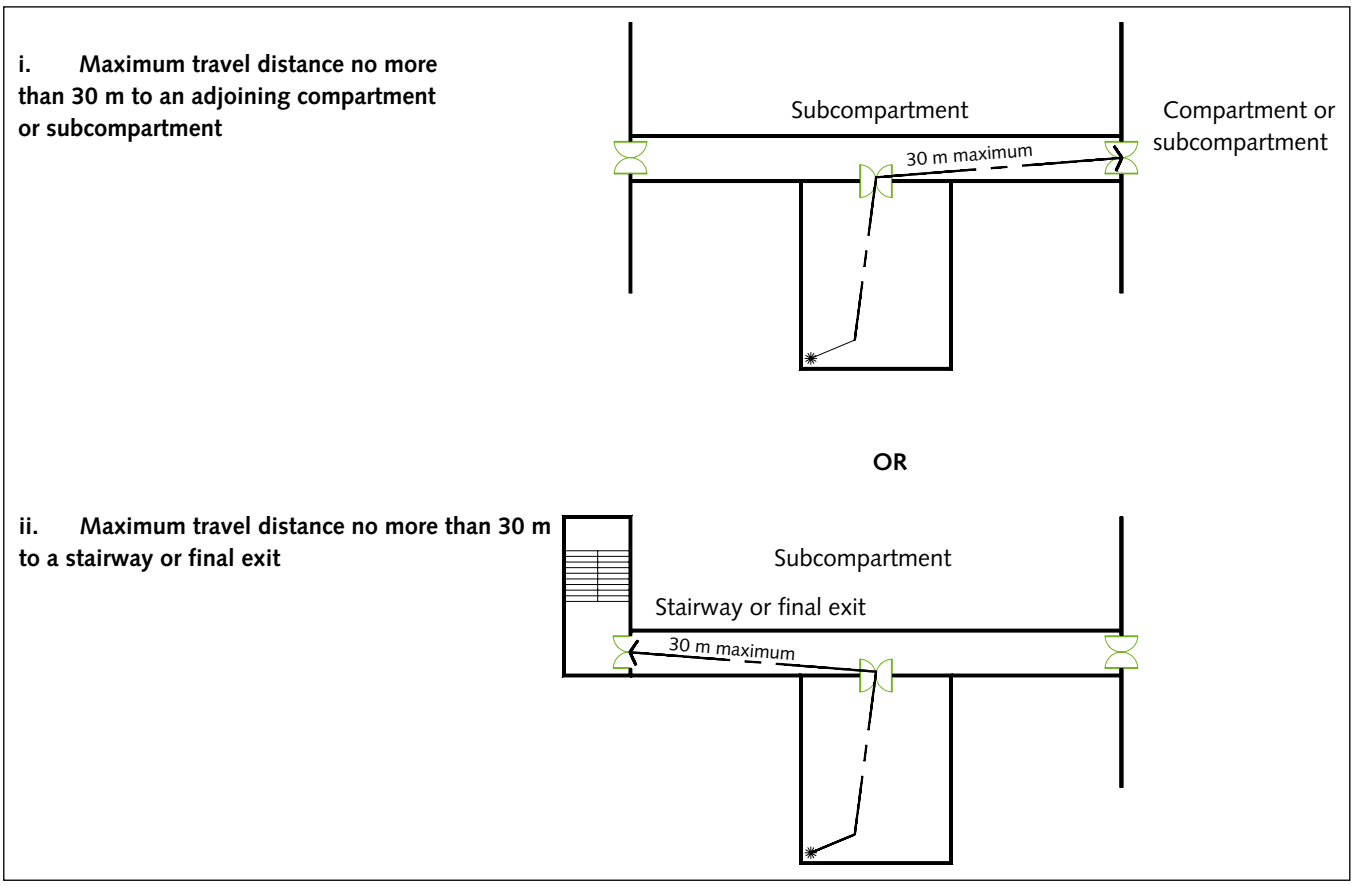


Figure 4 Travel distance within a subcompartment



5.39 Single-direction-of-escape travel distance is an element of maximum travel distance.

Hospital streets

5.40 The hospital street provides an essential link between hospital departments and stairways and lifts; it is the main circulation route for staff, patients and visitors. Although many hospitals will be provided with hospital streets, they are not an essential requirement.

5.41 A hospital street is a special type of compartment that connects final exits, stairway enclosures and department entrances. It has two functions from a fire safety aspect:

a. it will serve the fire-and-rescue service as a fire-fighting bridgehead; and

b. if the spread of fire within a department cannot be brought under control, the occupants of the department affected may be evacuated via the hospital street to parts of the hospital not affected by the fire.

5.42 A hospital street should:

a. be constructed to the same fire-resisting standards as a fire compartment;

b. have a minimum clear width of 3 m;

c. be divided into a minimum of three subcompartments, each with a maximum length of 30 m;

d. at ground floor – have a minimum of two final exits located:

(i) at every extremity of the hospital street;

(ii) so that the maximum travel distance between final exits is no more than 180 m measured along the length of hospital street;

(iii) so that the maximum distance from a compartment exit to a final exit is no more than 90 m;

e. at upper levels – have access to a minimum of two stairways each in separate subcompartments, which are located so that:

(i) the maximum distance between stairways does not exceed 60 m;

(ii) the maximum single direction of travel within the street does not exceed 15 m;

(iii) the distance from a compartment exit to a stairway is no more than 30 m;

f. contain no other accommodation except sanitary accommodation.

(See Figures 5 and 6.)

5.43 Entrances from the hospital street to adjoining compartments should:

a. not be located in the same street subcompartment as entrances to stairways and lift enclosures;

b. be located so that an alternative means of escape from each compartment is always possible (see Figure 6).

5.44 All stairways should be located so that the maximum travel distance from the exit from the stairway enclosure to the final exit of the hospital street is no more than 60 m at ground level.

Additional requirements for hospital streets with only three subcompartments

5.45 On upper storeys, stairways should be provided in two of the three subcompartments, and the third subcompartment should be capable of accommodating all the occupants of the largest adjoining compartment.

Width of escape routes

5.46 Generally within departments where beds and patient trolleys are being moved, the width of the circulation spaces required for these activities should be adequate for escape purposes. However, elsewhere, the width of escape routes should be determined by the number of people who would normally be expected to use them in an emergency. In addition, the use of steps should be avoided on circulation routes. Changes in level should be overcome using ramps.

Note

Guidance on suitable widths of circulation routes within hospital departments, for operational purposes, is available in Health Building Note 00-04 – 'Circulation and communication spaces'.

5.47 In departments and areas where beds or patient trolleys **will not** be used, the minimum clear width of escape routes should be:

a. for up to 200 people – 1200 mm;

b. for over 200 people – an additional 275 mm for every additional 50 people.

Vertical escape

5.48 In healthcare premises, the practice of designating certain stairways as escape stairways and others as communication stairways only is not acceptable, since in an emergency any stairway will be used if necessary. **Therefore all stairways should be designed as escape stairways other than those contained wholly within and only serving an atrium.**

5.49 Most healthcare premises will normally contain an adequate number of stairways due to functional requirements.

5.50 In buildings designed to comply with the guidance in this document, the provision of escape lifts is not considered necessary. However, to better facilitate evacuation, consideration should be given to the provision of such lifts.

5.51 Where escape lifts are considered necessary, a minimum of two lifts should be provided, sufficiently remote from each other to ensure that at least one is always available. Additional guidance can be found in Health Technical Memorandum 05-03: Part E – 'Escape bed lifts' and BS 5588-8.

5.52 Every hospital should be provided with a minimum of two stairways. Where hospitals are provided with hospital streets, the stairways should be located within the hospital street. In hospitals not provided with hospital streets, stairways should be provided to each compartment.

5.53 In all healthcare premises, stairways should be located so that alternative means of escape is always available from every compartment and subcompartment.

5.54 External stairways should not be provided for escape purposes from patient-access areas.

5.55 Stairways should always be remote from each other so that in the event of fire at least one is available for evacuation purposes.

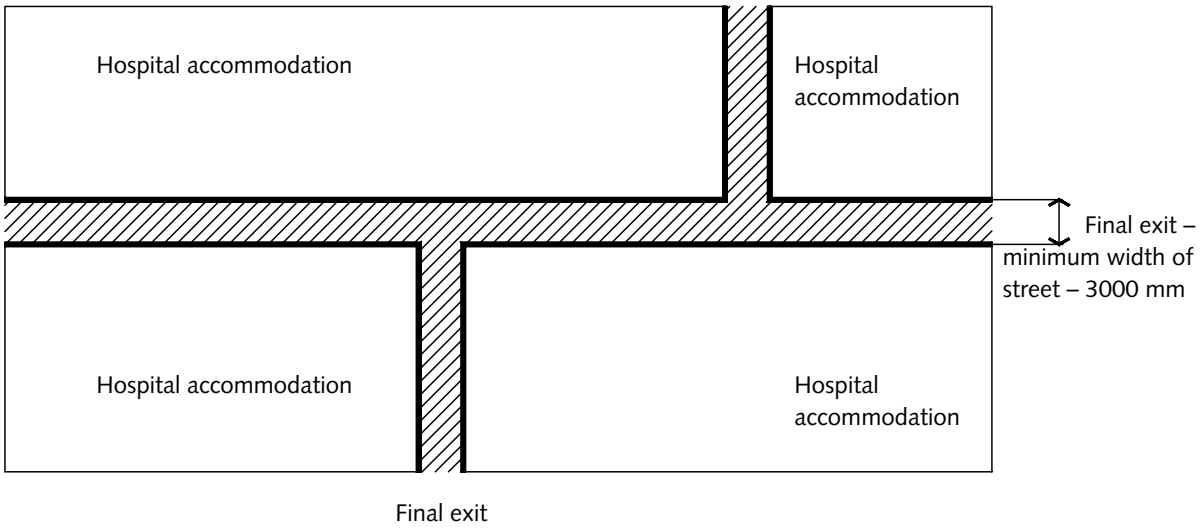
Mattress evacuation

5.56 All stairways to areas that provide sleeping accommodation or contain dependent or very high dependency patients should be designed to permit

Figure 5 Ground-floor hospital streets (paragraphs 5.40–5.46)

i. Basic design

Minimum width of street 3000 mm
Final exit at every extremity



ii. Basic subdivision

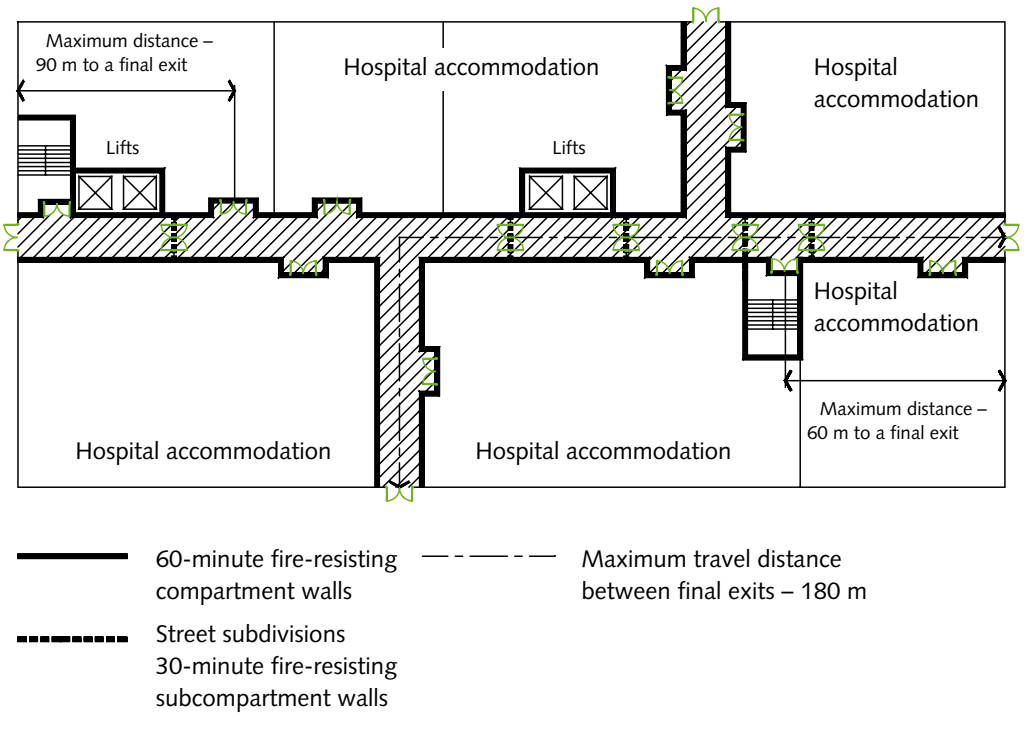
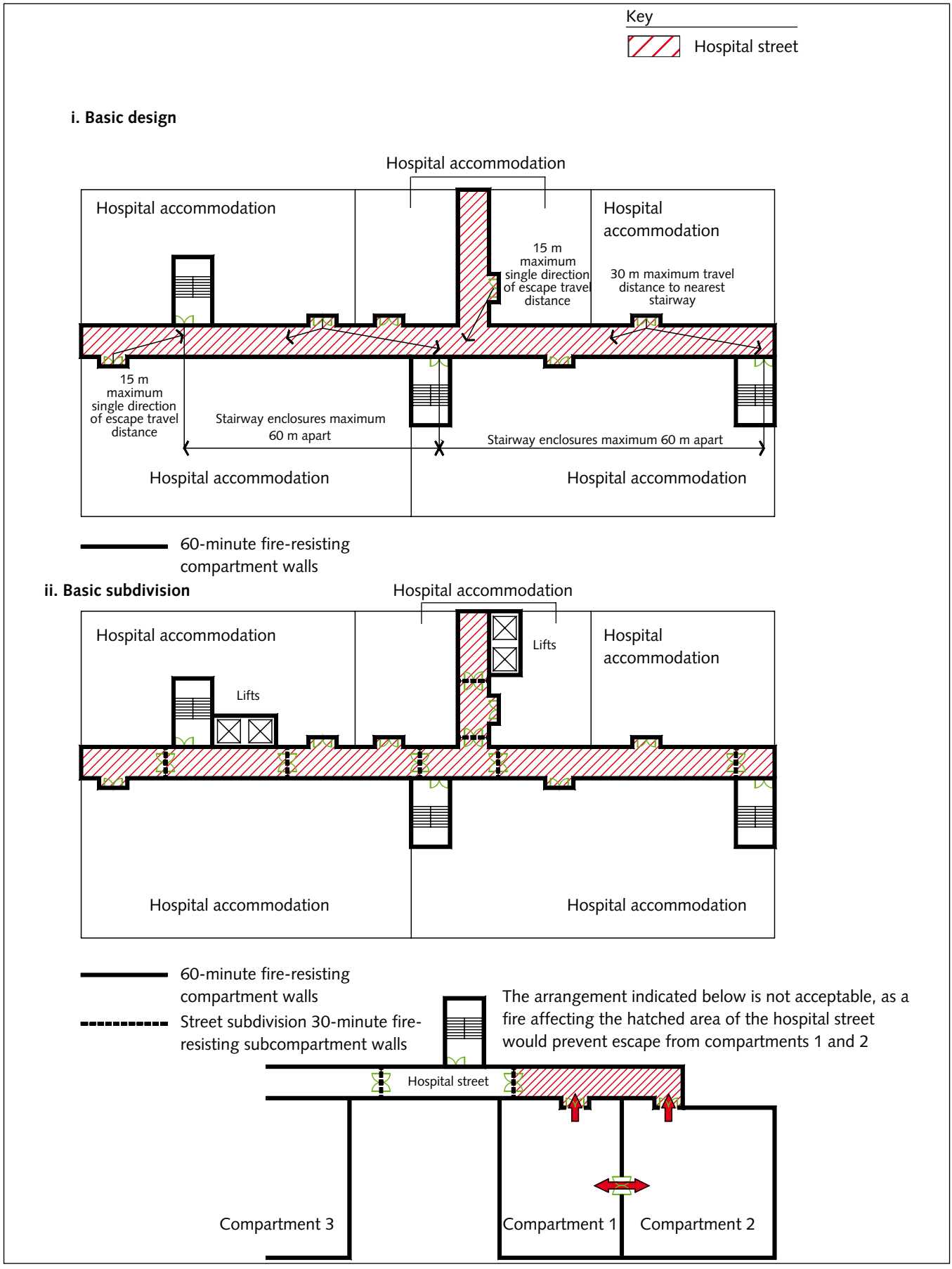


Figure 6 Hospital streets on upper floors (paragraphs 5.40–5.46)



the evacuation of patients on mattresses (mattress evacuation) or other similar methods.

5.57 Table 1 in Health Building Note 40-02 – 'Part C: Circulation and communication spaces' provides guidance on acceptable dimensions.

Notes

Table 1 in HBN 40-02 – Part C gives various stairway widths and associated landing widths and depths, all of which allow mattress evacuation but vary in their capacity to enable pedestrian passing when the stairway is being used for mattress evacuation. The evacuation strategy will determine which would be the optimum design size.

The stair width is not determined by the number of people expected to use the flight in a fire emergency, but on the requirements of mattress manoeuvrability, and therefore the guidance in Approved Document K – 'Protection from falling, collision and impact' in relation to landing depths need not be applied.

Width of stairways not intended for mattress evacuation

5.58 Where stairways are provided to areas not including patients' sleeping accommodation, the width of the stairway should be determined from the guidance in paragraph 5.47.

All stairways

5.59 All stairways should terminate at final exit or escape level and:

a. provide access to the outside; or

b. discharge to a route from the base of the stairway to the outside, which provides the same period of fire resistance as the protected shaft and which contains no accommodation except that permitted for a protected shaft; or

c. discharge to a hospital street.

Additional requirements for stairways

5.60 Escape stairs should not discharge to an atrium.

Note

Additional requirements for the enclosure and ventilation of stairways are provided in paragraphs 6.17–6.27.

Final exits

5.61 Generally, many of the final exits will also be used as everyday access to the building and consequently should be designed to permit access for people with restricted mobility. However, there may be some exits provided only for escape purposes.

5.62 The design of all exits should recognise the need to maintain the delicate balance between the requirements of means of escape and those of security. It is not possible to provide definitive guidance on this issue; however, any solution should be agreed between the enforcing authorities, the trust management and its security advisers.

5.63 Final exit doors should open outwards and should never be provided with locks requiring a key for opening.

5.64 Automatic final exit doors should be freely openable by hand under any condition, including power failure; otherwise, adjacent non-automatic outward-opening doors must be provided.

5.65 Final exit doors from patient-access areas should not be provided with a step.

External escape routes

5.66 Should it become necessary to evacuate an entire building or part of a building, adequate external assembly positions should be available. Suitable positions may be roadways, hard standings or suitably designed parts of the landscaping.

5.67 The following points should be considered when designing external escape routes:

a. the location of assembly positions to permit access for ambulances;

b. the provision of adequate artificial lighting;

c. the provision of adequate paved footpaths and dropped kerbs to the assembly points;

d. the gradients of external escape routes;

e. the proximity of external escape routes to the external wall of the building.

Emergency and escape lighting

5.68 Guidance on emergency lighting is contained within BS 5266-1. For hospital buildings, this is supplemented by Health Technical Memorandum 06-01 – 'Electrical services: supply and distribution' and the CIBSE guide – 'Lighting guide LG2: hospitals and healthcare buildings', which provide

additional guidance on hospital emergency lighting and details of the electrical supply required. The guidance in these documents should also be applied to primary care premises where invasive procedures are undertaken.

5.69 In the event of failure of mains supply, the essential lighting circuits should be designed to provide between 30% and 50% of the normal lighting level.

5.70 The distribution boards for the essential and non-essential circuits may be in the same location but should be in separate metal cabinets.

5.71 In those areas where a 15-second response time would be considered hazardous (for example stairways), emergency lighting should be provided by battery back-up giving a typical response time within 0.5 seconds and a minimum duration time of three hours.

5.72 In those areas of hospitals which are not provided with essential and non-essential circuits as required by Health Technical Memorandum 06-01, escape lighting should be provided in accordance with BS 5266-1 with a minimum duration time of three hours.

Special requirements for critical care areas

5.73 In these departments, any movement or evacuation of patients may be life-threatening; consequently, additional precautions are required to address the implications of:

a. fire and smoke in an adjacent compartment outside the critical care area;

b. fire and smoke within the department itself.

5.74 The aim of any design should be to prevent a fire in an adjacent compartment either on the same storey or on a storey above or below requiring the evacuation of a critical care area. The compartmentation and HVAC (heating, ventilation and air-conditioning) should be designed so that an adequate period of time is provided to enable a fire to be detected and extinguished before it threatens the occupants.

5.75 To reduce the possibility of smoke entering a critical care area, every door opening in the compartment wall should be provided with a protected lobby, each door of which will provide a minimum period of fire resistance of 30 minutes (integrity), with the exception of doors off a hospital street.

Background information on emergency and escape lighting

To enable essential services to be maintained, most hospitals are provided with standby generators which operate when there is a failure of mains electricity. These are designed to provide an emergency electrical supply within 15 seconds of a mains failure. In those areas of the hospital where a 15-second response time is unacceptable for clinical or health and safety reasons (for example operating theatres, circulation routes and stairways, main waiting areas, retail units), battery backup, with a typical response time within 0.5 seconds, is provided.

In hospitals, electrical distribution is generally provided by essential and non-essential electrical circuits. These are normally segregated; however, where this is not possible, essential services cables should be wired in fire-resistant cable.

Consequently, within hospitals, emergency lighting is provided by separately wired and controlled essential and non-essential electrical circuits. The luminaires connected to the essential circuits are designed to provide between 30% and 50% of the normal lighting level in the event of failure of the mains supply. **This is an operational requirement and cannot be enforced through the current Building Regulations.**

In addition to the above, within each hospital department separate circuits are provided for circulation spaces. Therefore, failure of a lighting circuit supplying a circulation space will not affect the lighting circuits in the adjacent rooms, and vice-versa. Generally, hospital streets are also supplied with independent essential and non-essential circuits. This large number of electrical circuits should ensure that when one lighting circuit fails as a result of fire, the other circuits will still provide acceptable levels of lighting.

Subcompartmentation in critical care areas

5.76 Critical care areas and special care baby units should be divided into two subcompartments in order to separate the "nursing area" from the "utility area". The following provides an example:

a. Subcompartment one – staff base:
   - bed areas;
   - clean utility;
   - dirty utility;
   - linen store;
   - status laboratory;

b. Subcompartment two – entrance area:
   - staff changing;
   - staff rest rooms;
   - seminar rooms;
   - cleaners' store;
   - main equipment store;
   - bulk store;
   - on-call area.

Heating and ventilation systems

5.77 The HVAC systems provided to critical care areas are designed so that the pressure within the department is maintained at a level slightly above that of the adjacent areas. In a fire emergency, the continuing operation of these systems will assist in preventing smoke and other products of combustion entering the critical care area.

5.78 In critical care areas, the HVAC systems should be designed so that they continue to operate in a fire emergency. The shut-down of these systems should be on the instruction of the fire-and-rescue service and should be controlled from remote panels located either at the department entrance or adjacent to the main fire-alarm indicator panel.

Plant areas

5.79 The means of escape from plantrooms should be designed to take account of the fire hazard presented by the equipment or contents of the room and any hindrance to the movement of the occupants (for example low headroom).

5.80 The escape route should be clear of obstructions.

5.81 Where a minimum of two exits are provided, the maximum travel distance from any point within a plantroom should not exceed 25 m to the nearest exit from where alternative means of escape are provided. Of this 25 m, the maximum single direction of escape should not exceed 12 m.

5.82 Where only one exit is provided, the maximum travel distance should not exceed 12 m.

5.83 Where only one exit is provided, or where there is a danger of people being trapped, alternative means of escape such as ceiling hatches and fixed ladders should be provided.

5.84 Where the plantroom can be shown to be of very low risk (for example only containing air-handling plant), the distances above may be extended to 25 m and 35 m respectively.

Operating departments

5.85 Operating departments, by their very nature, are considered to be very high dependency areas and are therefore to be treated as a compartment. Unnecessary evacuation of these departments may be life-threatening; therefore, additional measures may be required to allow sufficient time to prepare patients for evacuation.

5.86 The operating department should be enclosed in 60 minutes' fire-resisting construction. Subcompartmentation is recommended to ensure that no more than 50% of operating theatres would be compromised at any one time in the event of a fire.

6 Containment

Principle

6.1 The design and construction of the healthcare building should:

a. provide sufficient resistance to the effects of fire and maintain its structural stability to provide adequate time for escape and extinguishment;

b. inhibit the spread of fire and smoke within the building;

c. inhibit the spread of fire to adjacent buildings.

Elements of structure

6.2 To prevent the premature failure of the structure, the load-bearing elements of the building are required to have a minimum period of fire resistance in terms of resistance to collapse or failure of load-bearing capacity. The purpose of providing the structure with fire resistance is:

a. to minimise the risk to the occupants, many of whom may still be in a temporary place of safety within the building awaiting evacuation;

b. to reduce the risk to fire-fighters;

c. to reduce the danger to people in the vicinity of the building.

6.3 For the purposes of this document, elements of structure are:

a. a column, beam, or other member forming part of a structural frame;

b. a load-bearing wall;

c. a floor;

except where the structure supports a roof which is not essential for the stability of a wall required to have a period of fire resistance.

6.4 The minimum period of fire resistance provided by the elements of structure should be as in Table 2.

Table 2 Fire resistance of elements of structure

	Minimum period of fire resistance provided by compartmentation	
	Unsprinklered	**Sprinklered**
Single-storey healthcare buildings	30 minutes	30 minutes
Healthcare buildings with storeys up to 12 m above ground or basements no more than 10 m deep	60 minutes	30 minutes* (60 minutes in respect of basements*)
Healthcare buildings with storeys over 12 m above ground or basements more than 10 m deep	90 minutes	60 minutes*
Healthcare buildings with storeys over 30 m	120 minutes	90 minutes*

Notes:

* The reduction in fire resistance is conditional upon clear instructions regarding the maintenance and inspection requirements for the sprinkler system.

Elements of structure in relation to basements include the ground-floor slab.

Where one side of a basement is (due to the slope of the ground) open at ground level, giving an opportunity for smoke venting and access for fire-fighting, it may be appropriate to adopt the standard of fire resistance applicable to above-ground structures for elements of structure in that storey.

In order to reduce the fire resistance to elements of structure, the whole building must be protected by a sprinkler installation

Compartmentation

6.5 The requirement for compartmentation is discussed in Chapter 5. Within patient-access areas, compartmentation is used to divide a storey into places of temporary safety which may be used for refuge. In addition, compartmentation prevents rapid fire spread throughout the building and reduces the likelihood of large fires.

6.6 In hospitals, the maximum size of a compartment is generally determined by its use; the size of the hospital department determines the size of a compartment (see paragraph 5.18).

6.7 The maximum area of a compartment should not exceed:

a. 2000 m² in a multi-storey building;

b. 3000 m² in a single-storey bulding.

6.8 The minimum period of fire resistance (integrity and insulation) provided by compartment walls should be:

a. for single-storey healthcare buildings – 30 minutes (except where this conflicts with the requirements of Table 1);

b. for sprinklered healthcare buildings – 30 minutes for up to 12 m above ground level;

c. for all other healthcare buildings – 60 minutes, including those with basements more than 10 m deep and those four storeys or more above ground level.

6.9 All compartment floors are considered as elements of structure and should satisfy the requirements of Table 2.

Elements of structure and compartment walls

6.10 The fire resistance of an element of construction is a measure of its ability to withstand the effects of fire in one or more ways, as follows:

a. resistance to collapse; that is, the ability to maintain load-bearing capacity (which applies to load-bearing elements only);

b. resistance to fire penetration; that is, an ability to maintain the integrity of the element; and

c. resistance to the transfer of excessive heat; that is, an ability to provide insulation from high temperatures.

Elements of structure and compartment walls are required to meet the above provisions. Materials used to meet this provision can be found in the Glossary (Chapter 2) under "Material of limited combustibility".

6.11 Where sprinklers are installed throughout the whole building, the requirement for elements of structure and compartment walls to be constructed of materials of limited combustibility does not apply.

Glazing in a compartment wall

6.12 Any glazing provided in a compartment wall should have the same period of fire resistance (integrity and insulation) as the compartment wall. Glazing should have a permanent, legible mark giving the manufacturer, product name, fire-resistance rating and any requirement for impact safety performance according to BS 6206 or BS EN 12600.

Transfer grilles

6.13 Air transfer grilles that do not provide smoke and fire containment should not be provided in any wall, door, floor, ceiling enclosing a protected shaft, or compartment wall (see also paragraph 6.34 for transfer grilles in fire hazard rooms).

Junction of compartment walls with roofs

6.14 Compartment walls should be taken up to the underside of the roof covering or deck, and fire-stopped to maintain the fire resistance.

Openings in floors and compartment walls

6.15 All openings in floors and compartment walls should be protected to provide at least the same period of fire resistance as the compartment structure.

6.16 To maintain the integrity of compartmentation, openings should be limited to:

a. doors which have a period of fire resistance not less than that of the compartment structure (that is, integrity performance);

b. openings for pipes of not more than 160 mm diameter which, if exposed to a temperature of 800°C, will not soften or fracture to the extent that flames or hot gases will pass through the wall of the pipe;

c. pipes of materials other than those in (b) above of not more than 40 mm diameter;

d. pipes of any diameter which are provided with a proprietary seal which has been shown by test (for the diameter of pipe proposed) to maintain the fire resistance of the compartment structure;

e. ventilation ducts which comply with the requirements of BS 5588-9 (see Figure 10);

f. refuse and laundry chutes of non-combustible construction which are accessed through fire-resisting doors;

g. protected shafts.

Protected shafts

6.17 Openings in floors for stairways, lifts, escalators, and pipes and ducts not complying with paragraph 6.15 should be enclosed in a protected shaft that has the same period of fire resistance (integrity, insulation and, where applicable, load-bearing capacity) as the compartment floor (see Figure 7).

6.18 The protected shaft should form a complete barrier to fire between the different compartments to which the shaft connects and be constructed from materials of limited combustibility. Where pipes are required to pass through the enclosing structure, they should be designed in accordance with Figure 8.

6.19 Any internal glazing provided to a protected shaft should have the same period of fire resistance (integrity and insulation) as the protected shaft.

6.20 The use of roof lights over protected shafts used for stairways should be limited to those that provide a Class 1 surface spread of flame on both upper and lower surfaces.

6.21 The use of protected shafts should be limited to:

a. stairways;

b. lifts;

c. escalators;

d. chutes;

e. ducts;

f. pipes.

6.22 No accommodation should be included within protected shafts.

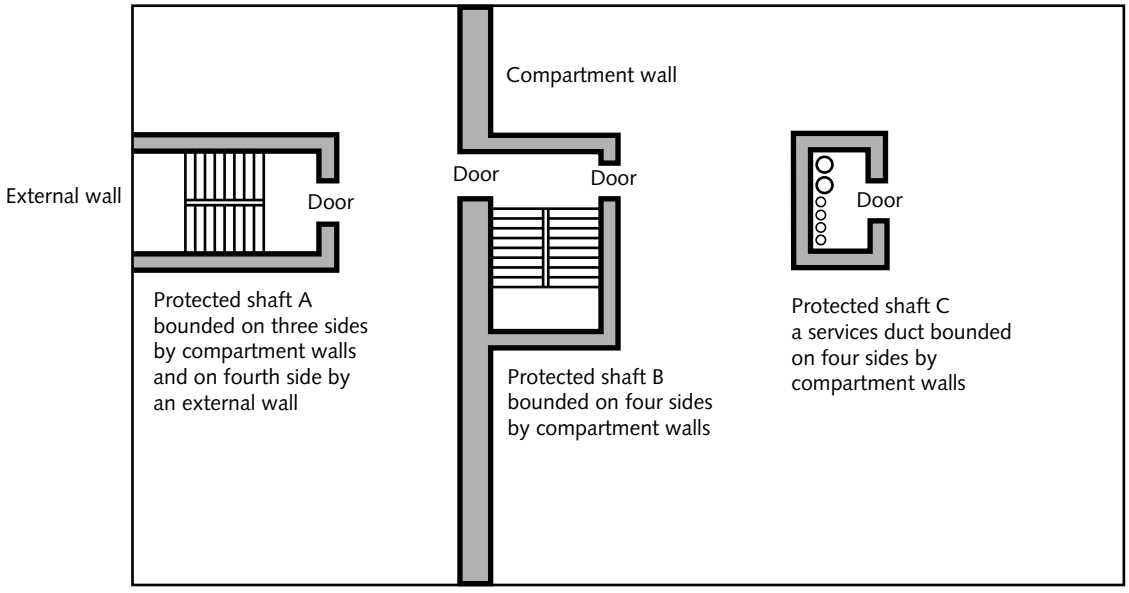
6.23 Pipes conveying oil or gas and ventilation ductwork should not be located in the same protected shaft as a stairway or lift – **except pipes conveying oil as part of the operating mechanism of a hydraulic lift and ventilation ductwork provided for the purposes of pressurising the stairway.**

6.24 Means for ventilating protected shafts to provide smoke clearance should be provided at the top of the shaft as follows:

a. for a protected shaft containing a stairway – an openable window, or similar, providing an area of 1000 mm²;

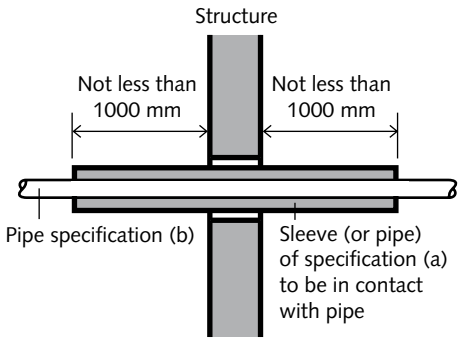
b. for a protected shaft containing a lift or lifts – a permanent opening of 100 mm² for each lift.

Figure 7 Protected shafts



Note: The protected shaft should meet the relevant provisions for compartment walls

Figure 8 Pipes penetrating fire-resisting structure



	Pipe material and maximum nominal internal diameter (mm)		
	(a) Non-combustible material[1]	**(b) Lead, aluminium, aluminium alloy, uPVC[2], fibre cement**	**(c) Any other material**
Structure enclosing a protected shaft which is not a stairway or lift shaft	160	110	40
Any other situation	160	40	40

Notes:
1. Any non-combustible material (such as cast iron, copper or steel) which, if exposed to a temperature of 800°C, will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.
2. uPVC pipes complying with BS 4514 and uPVC pipes complying with BS 5255.

Protected lobbies

6.25 Protected shafts for stairways and lifts should be provided with protected lobbies except where they are accessed from a hospital street.

6.26 Protected lobbies should not be located so that they form part of a through route; that is, they should not be located across a corridor if the corridor continues beyond the protected lobby (see Figure 9).

6.27 Protected lobbies should:

a. be constructed from materials of limited combustibility and have the same fire resistance as the protected shaft;

b. contain no other accommodation except that allowed for protected shafts.

Fire hazard rooms and areas

6.28 For most building types, it is normally required to protect escape routes with fire-resisting walls, ceilings and doors (protected corridors). In hospitals this is not considered acceptable, since the excessive number of fire-resisting doors, all fitted with self-closing devices, would be a hindrance to staff and patients during the everyday running of a healthcare building. For this reason, the technique advocated for healthcare buildings is to identify and segregate fire hazard rooms by at least 30 minutes' fire-resisting construction.

6.29 Table 3 gives examples of fire hazard rooms. The list is not exhaustive, and the onus rests with the designer to assess the fire risk associated with all rooms to determine the need to enclose in fire-resisting construction.

Figure 9 Protected lobbies to stairways (paragraphs 6.25–6.27)

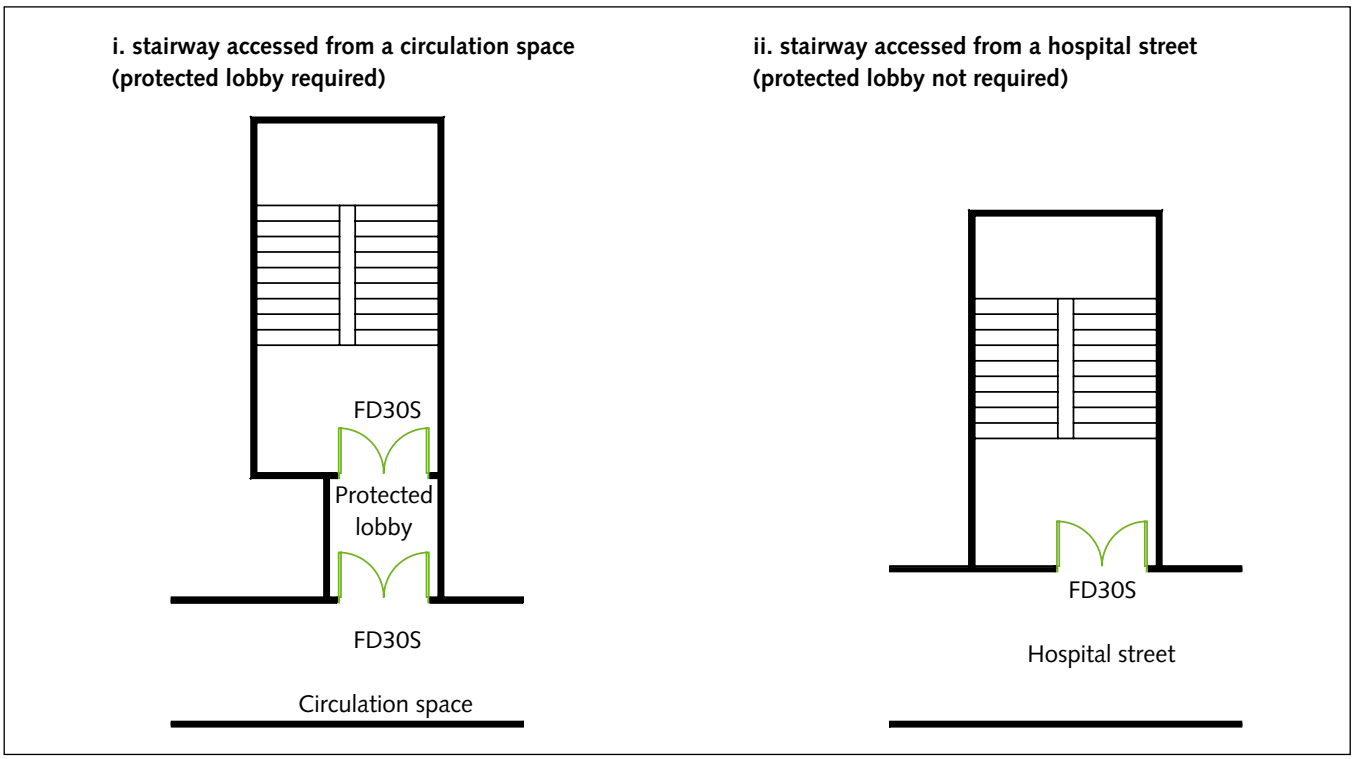


Table 3 Examples of fire hazard rooms

Chemical stores
Cleaners' rooms
Clothes storage
Disposal rooms
Hub rooms
Lift motor rooms
Staff changing and locker rooms
Storerooms
Dayrooms
Relatives overnight rooms
Ward kitchens
Laboratories
Linen stores
Staff on-call rooms
All rooms within the main laundry in which delivery, sorting, processing, packing and storing are carried out
Patient bedrooms provided specifically for: a. the elderly; b. those suffering from mental illness; c. people with learning disabilities.

Key:

Doors to these rooms should be kept locked shut.
Doors to these rooms may be fitted with free-swing closing devices.
Doors to these rooms should be fitted with self-closing devices.
Doors to these rooms do not require self-closing devices due to the potential for impeding escape during a fire emergency.

6.30 Fire hazard rooms and areas should be enclosed in 30 minutes' fire-resisting construction (integrity and insulation). Walls may be terminated at ceiling level provided that:

a. the ceiling is non-demountable and has a minimum period of fire resistance of 30 minutes when tested (complete with any lighting units) from below in accordance with BS 476 (Parts 20 and 22);

b. ducts perforating the ceiling are fitted with fire shutters operated by heat-activated fire dampers;

c. conduits, pipes etc perforating the ceiling are fire-stopped and comply with the requirements of paragraph 6.16.

6.31 Where sprinklers are installed, the need to enclose fire hazard rooms in fire-resisting construction should be risk assessed.

Glazed screens

6.32 The maximum area of uninsulated glazing should be limited to 1000 mm² in any one room, and should only be provided in walls enclosing the following fire hazard rooms:

a. dayrooms;

b. laboratories;

c. laundry – between supervising office and work area only.

6.33 There is no limit on the use of glazed screens which provide a minimum period of fire resistance of 30 minutes when tested to the relevant parts of BS 476 (integrity and insulation) or BS EN 12600.

Transfer grilles

6.34 Where there is an operational requirement for "make up" air to be provided to fire hazard rooms, the possibility of fire and smoke spread should be countered by using transfer grilles that incorporate fire and smoke containment. This should be fully detailed in any fire strategy document. Transfer grilles should not be fitted in fire doors unless accompanied by a test certificate provided by the door manufacturer.

Ventilation ductwork

6.35 Ventilation ductwork should comply with the requirements of BS 5588-9 and Health Technical Memorandum 2025 – 'Ventilation in healthcare premises' (soon to be replaced by Health Technical Memorandum 03-01 – 'Specialised ventilation for healthcare premises').

6.36 Ductwork passing through compartment walls, subcompartment walls and cavity barriers should be provided with fire-and-smoke dampers in accordance with Figure 10.

6.37 Ductwork passing through, or over, fire hazard rooms should be provided with fire dampers in accordance with Figure 11.

6.38 Ductwork passing through cavity barriers should be provided with fire dampers in accordance with Figure 10.

Cavity barriers

6.39 Concealed spaces or cavities in the construction of a building may permit the rapid spread of fire and smoke. It is possible for fire and smoke to be transferred to areas remote from the seat of the fire by way of uninterrupted concealed spaces. For this reason, it is essential that fire-resisting barriers are provided to restrict the size of these concealed spaces.

6.40 In hospitals, the subdivision provided through the requirements for hazard protection, subcompartmentation and compartmentation is such that generally the additional subdivision of ceiling voids for cavity barriers is not required. The exception to this is where subcompartment walls and walls to fire hazard rooms are terminated at 30-minute fire-resisting ceilings.

6.41 Irrespective of the above, there is a requirement to prevent the interconnection of horizontal and vertical cavities.

6.42 Guidance on the construction and fixing of cavity barriers is provided in Appendix E.

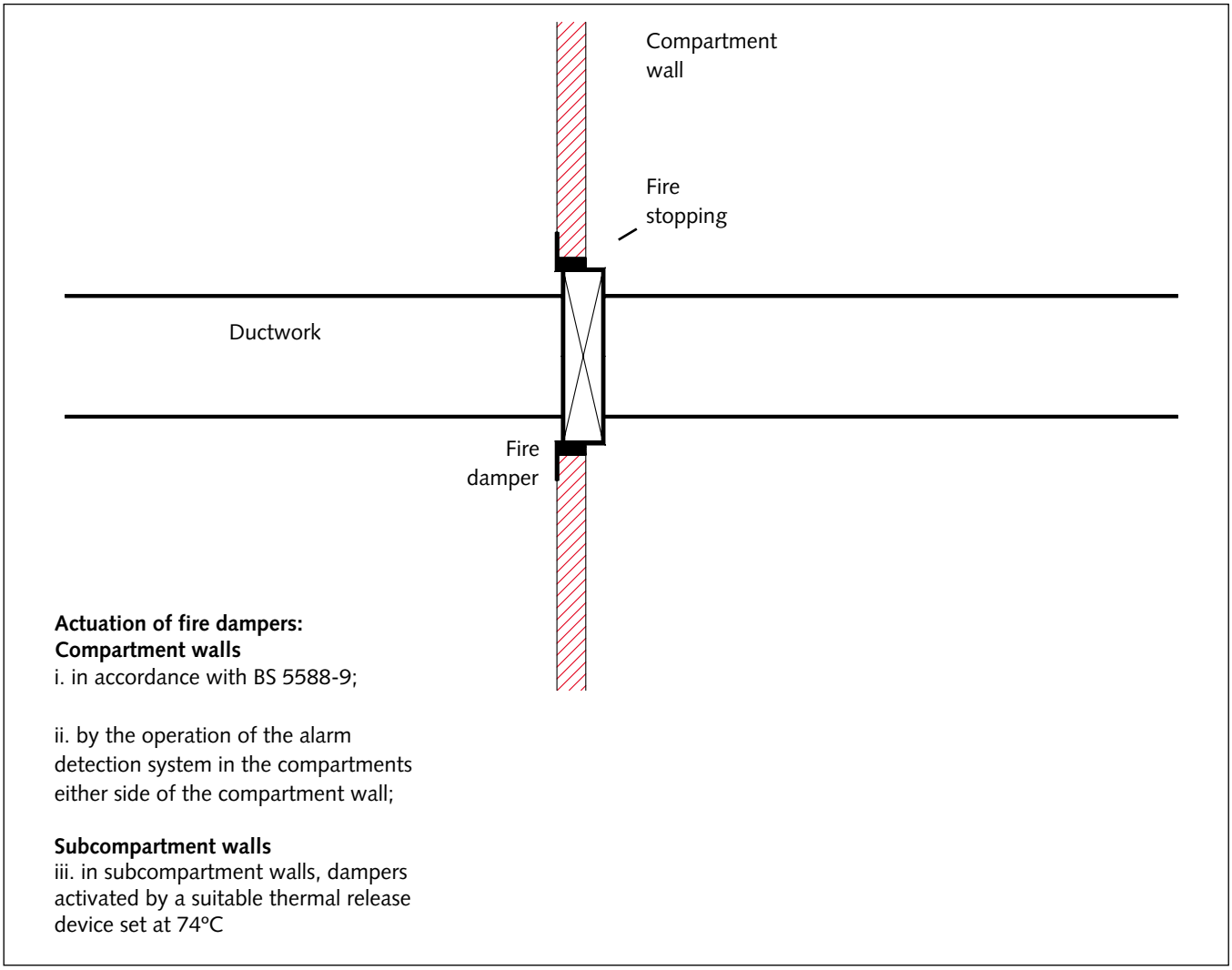
6.43 With the exception of the ceiling void above operating departments (see paragraph 6.48), 30-minute fire-resisting barriers should be provided to subdivide concealed roof or ceiling voids. These should be positioned to coincide with subcompartment walls and walls to fire hazard rooms.

6.44 The maximum area of uninterrupted roof or ceiling void should not exceed 400 m².

6.45 Thirty-minute fire-resisting cavity barriers should also be provided:

a. to prevent the interconnection of vertical and horizontal cavities;

Figure 10 Fire-and-smoke dampers in compartment walls, subcompartment walls and cavity barriers (paragraphs 6.16, 6.36 and 6.81)



b. at the intersection of fire-resisting construction and elements containing a concealed space;

c. within the void behind the external face of rain-screen cladding, at every floor level and on the line of compartment walls abutting the external wall.

6.46 Cavity barriers should not be provided:

a. in cavity walls as illustrated in Figure 12; or

b. in double-skinned insulated roof sheeting as illustrated in Figure 13; or

c. below a floor next to the ground or oversite concrete providing:

(i) the cavity is less than 1000 mm in height; or

(ii) it is not accessible by persons; and

(iii) there are no openings in the floor such that it is possible for combustibles to accumulate in the cavity.

Openings in barriers

6.47 Openings in barriers should be limited to those for:

a. doors which have at least 30 minutes' fire resistance;

b. pipes (see paragraph 6.16);

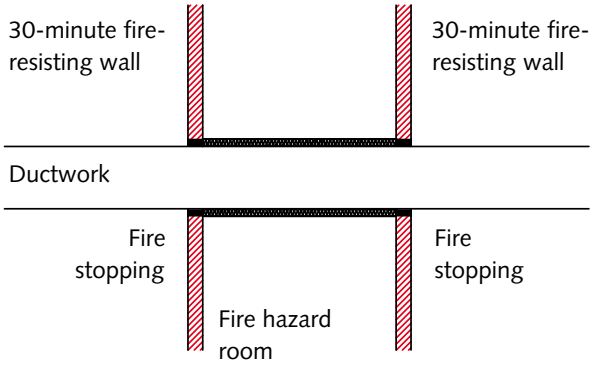
c. cables or conduits;

d. openings fitted with a suitably mounted automatic fire shutter;

e. ducts which, unless they are fire-resisting, are fitted with a suitably mounted automatic fire shutter where they pass through the cavity barrier.

Figure 11 Fire dampers to fire hazard rooms

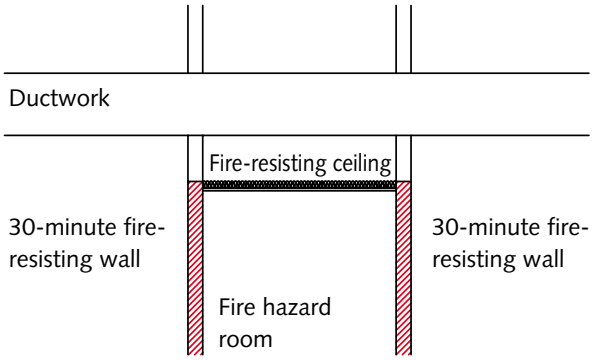
i. ductwork passing through but not serving fire hazard room



i. fire dampers not required;

ii. ductwork in the hazard room to have 30 minutes' fire resistance (integrity and insulation) when tested to the relevant parts of BS 476.

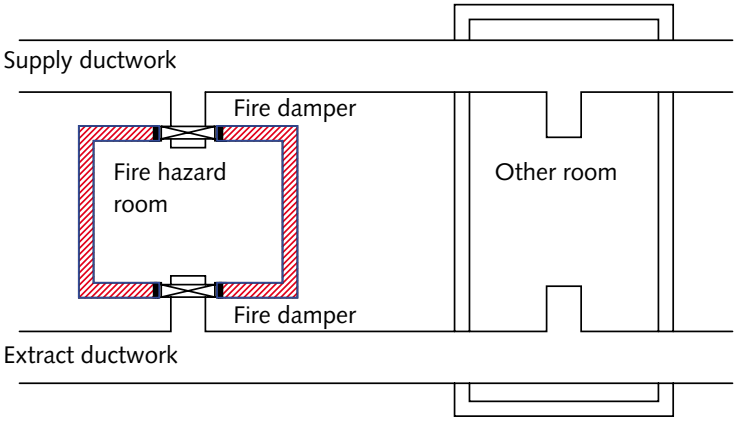
ii. ductwork passing over fire hazard room fitted with fire-resisting ceiling



i. fire dampers not required;

ii. ceiling to be non-demountable and have a minimum period of fire resistance of 30 minutes, when tested (complete with any lighting units) from below in accordance with BS 476 Parts 20 and 22.

iii. ductwork serving fire hazard rooms



i. ducts should not pass through the hazard room if the duct serves the fire hazard room and other rooms beyond the fire hazard room;

ii. the fire hazard room should be served by spurs fitted with fire dampers operated by fusible links;

iii. where flexible connections are used, they should comply with BS 5588-9 and not pass through the fire-resisting walls

Cavity barriers above operating departments

6.48 The complexities of ventilation ductwork systems above operating departments mean that the provision of cavity barriers would seriously compromise service access and means of escape for maintenance staff. Therefore cavity barriers should not be provided over operating departments.

6.49 Additionally, operating departments have restricted access and are well supervised when in use, and hazard areas are enclosed within fire-resisting construction.

Internal spread of flame – linings

6.50 The surface finish applied to walls and ceilings can contribute to the spread of a fire.

6.51 Some finishes will transfer fire from one area to another very quickly by "surface spread of flame". This not only makes the fire difficult to control, but also provides additional fuel, which will increase the severity of the fire.

6.52 Surface finishes which can be effectively tested for "surface spread of flame" are rated for performance by reference to the method specified in BS 476-7: 1971 or 1987, under which materials or products are classified 1, 2, 3 or 4, with Class 1 being the highest.

Note

Class 0 is the highest product performance classification; however, it is not a classification identified in any British Standard test.

Figure 12 Cavity wall not requiring cavity barriers (paragraph 6.46)

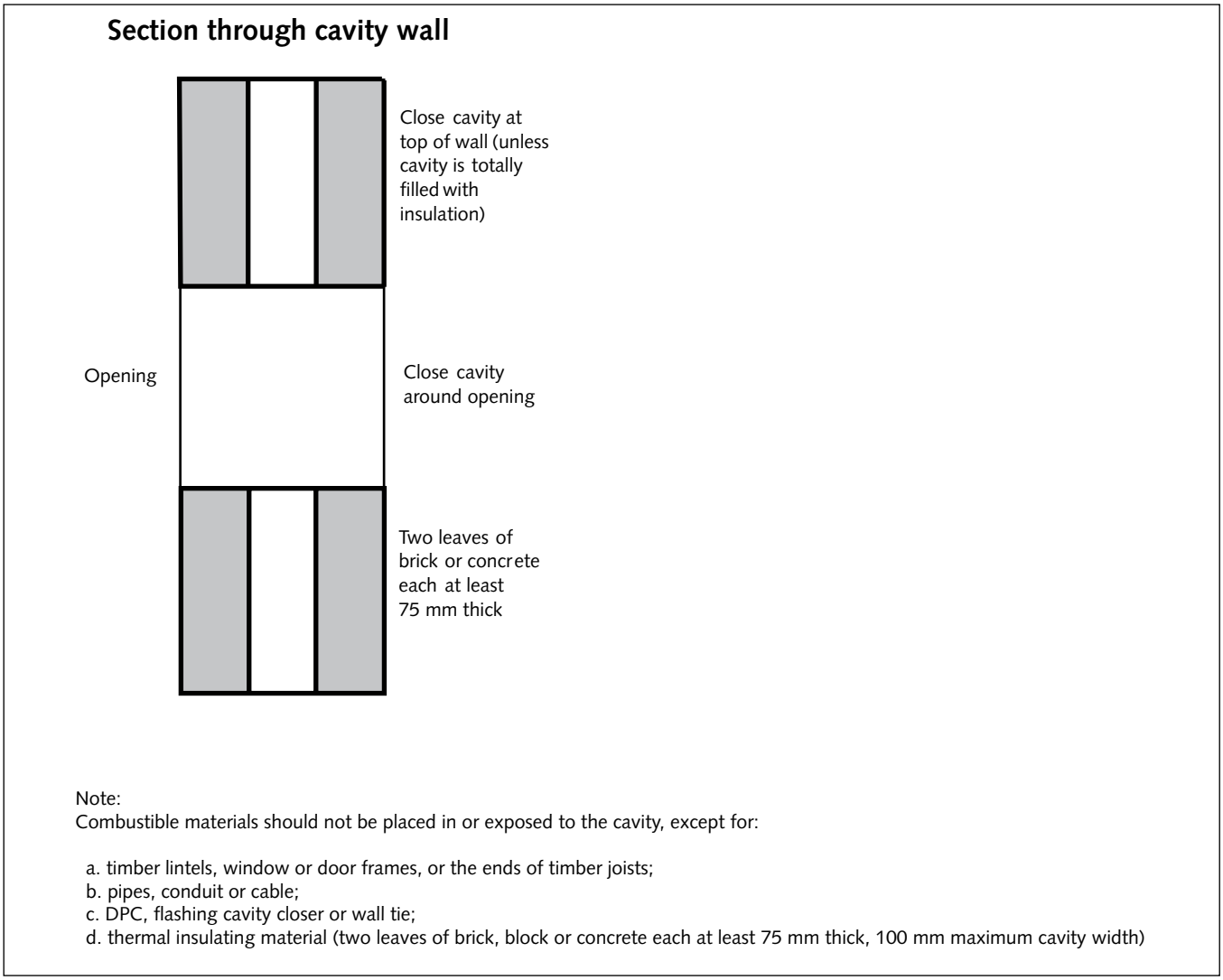
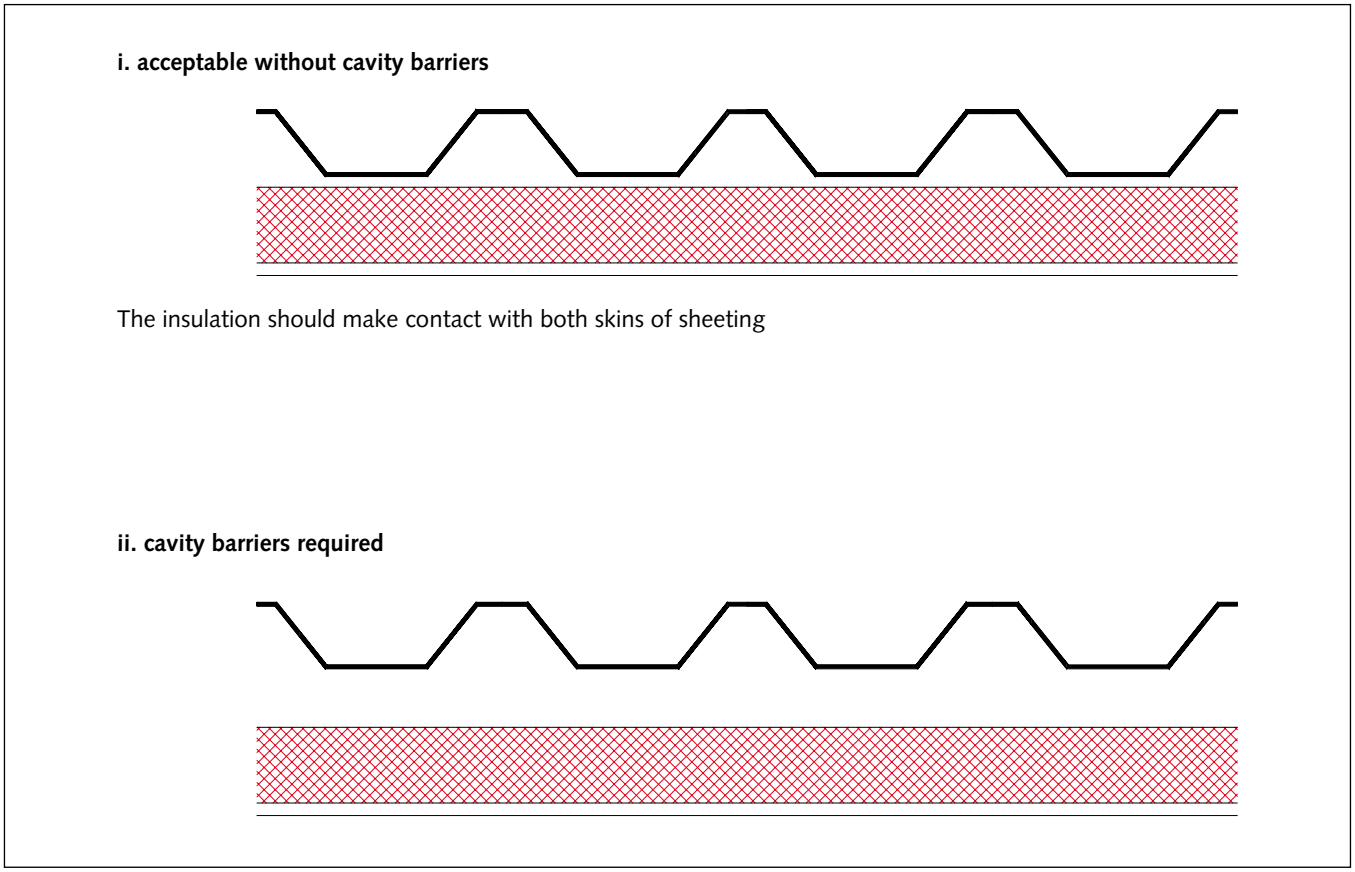


Figure 13 Cavity barriers in double-skinned insulated roof sheeting



6.53 Wall and ceiling finishes should meet the classifications in Table 4.

Roof lights

6.54 Roof lights should also meet the requirements of Table 4.

6.55 However, plastic roof lights with a Class 3 rating for surface spread of flame may be used, provided that the limitations imposed by paragraph 6.59 are observed.

Table 4 Classification of linings

Location	National classification	European class
Circulation spaces	0	B-s3,d2
Small rooms (maximum 4000 mm^2)	1	C-s3,d2
Other rooms	0	B-s3,d2

Notes:

The limitations on surface finishes do not apply to:

a. the demountable sanitary "back panels" commonly used in hospitals to provide access for maintenance behind hand-wash basins, toilets, showers etc; and

b. rooms providing a specialist function (for example audiology booths) where other functional criteria dictate the surface finish.

The national classifications do not automatically equate with the equivalent classifications in the European column; therefore, products cannot typically assume a European class unless they have been tested accordingly.

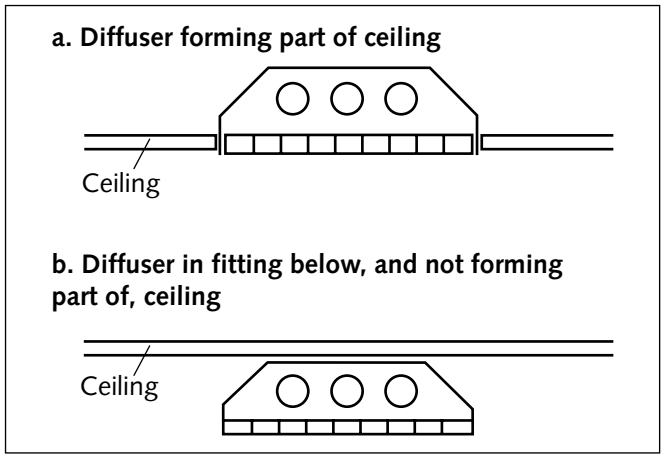
When a classification includes "s3,d2", this means that there is no limit set for the production and/or flaming droplets/particles.

Thermoplastic materials

6.56 Thermoplastic materials (see Appendix C) that cannot meet the performance requirements given in Table 4 may be used in roof lights and lighting diffusers in suspended ceilings if they comply with the requirements in paragraphs 6.58 and 6.59.

6.57 The guidance on the use of thermoplastic lighting diffusers applies irrespective of whether the lighting diffuser forms part of the ceiling or is attached to the soffit of, or suspended beneath, a ceiling (see Figure 14).

Figure 14 Lighting diffuser in relation to ceiling



6.58 Thermoplastic roof lights and lighting diffusers with a classification of lower surface of TP(a) (see Appendix C) may be used in all locations, except stairways, with no restrictions on:

a. the maximum area of each diffuser or roof light;

b. the maximum total area of diffusers and roof lights;

c. the minimum separation between diffusers and roof lights.

6.59 Thermoplastic roof lights and lighting diffusers with a classification of lower surface TP(b) (see Appendix C) and roof lights with a Class 3 rating may be used in all areas, with the following restrictions:

a. the maximum area of each diffuser or roof light should be no more than 5 m^2;

b. the maximum total area of diffusers and roof lights, as a percentage of the floor area of the space in which they are located, should be no more than 15%;

c. the minimum distance between diffusers and roof lights should be not less than 3000 mm.

(See Figure 15.)

6.60 Thermoplastic roof lights with a classification of upper surface TP(b) should not be used.

6.61 Thermoplastic lighting diffusers should not be used in a fire-resisting ceiling unless they have been satisfactorily tested as part of a ceiling assembly that provides the appropriate fire protection.

6.62 The minimum distance from a relevant boundary of thermoplastic roof lights with a classification of upper surface of TP(a) should be not less than 6 m.

External fire spread

6.63 In certain circumstances it may be necessary for the external walls or roofs of a healthcare building to provide a period of fire resistance to prevent fire spreading to adjacent buildings or parts of the same building in different compartments.

6.64 For walls, this requirement is determined by a combination of space separation between buildings and the amount of unprotected area within the walls.

6.65 Generally, roofs are the topmost element of the building and as a consequence are not required to provide a period of fire resistance from below. However, where a low-level roof abuts an external wall of a patient-access area, a portion of the roof should provide some fire resistance to prevent the fire spreading through the roof to other parts of the same building in different compartments.

6.66 With the exception of unprotected areas, the minimum period of fire resistance provided by external walls should be as in Table 5.

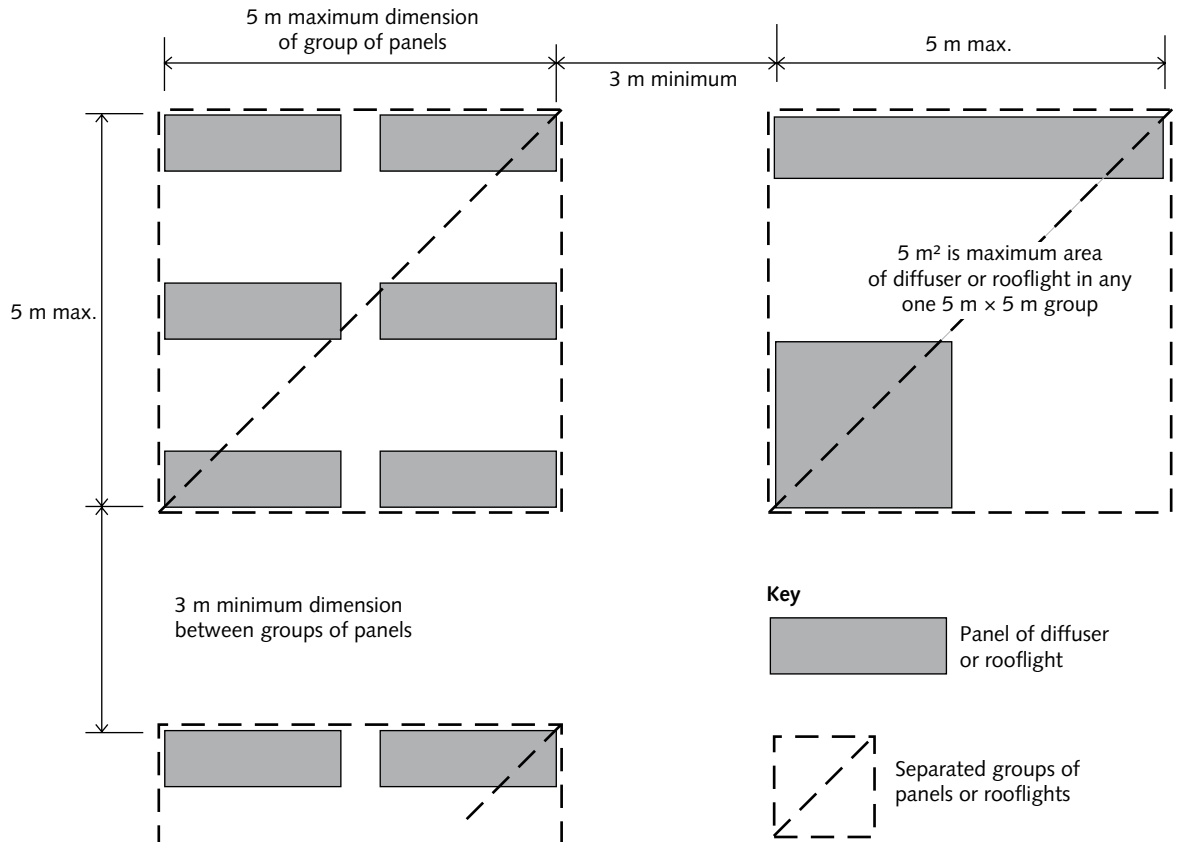
Table 5 Minimum period of fire resistance of external walls

Height to the top floor	Minimum period of fire resistance
Not more than 5 m	30 minutes
Over 5 m	60 minutes

Notes:

1. The minimum period of fire resistance relates to integrity and load-bearing capacity. The minimum provision for insulation is 15 minutes unless the external wall is less than 1000 mm from a boundary or adjacent building, when the requirement for insulation should be the same as that for integrity and load-bearing capacity.
2. An external wall that is also an element of structure should comply with Table 2.

Figure 15 Layout restrictions on Class 3 roof lights, TP(b) roof lights and TP(b) lighting diffusers



Notes:
a. Upper and lower surface of suspended ceiling, between plastic panels, to comply with paragraph 6.1 in Approved Document B.
b. No restriction on Class 3 roof lights in small rooms.

Space separation

6.67 In healthcare buildings up to 12 m in height, the maximum percentage of unprotected area in an external wall, in relation to the distance to adjacent compartments, buildings or boundaries, should be determined from the graph in Figure 16 (Figure 17 provides guidance on how to establish the relevant boundary, and Figure 18 provides guidance on establishing the notional boundary).

6.68 In healthcare buildings over 12 m in height, the maximum percentage of unprotected area in an external wall, in relation to the distance to adjacent compartments, buildings or boundaries, should be determined from the methods set out in the BRE Report 187 – 'External fire spread: building separation and boundary distances'.

6.69 When calculating the amount of unprotected area:

a. small unprotected areas as indicated in Figure 19 may be disregarded;

b. an external surface of combustible material more than 1 mm thick should be counted as an unprotected area amounting to half the actual area of the combustible material.

Canopies

6.70 Provided a canopy is more than 1000 m from a relevant boundary, the provision for space separation may be disregarded.

Surfaces of external walls

6.71 The surfaces of external walls of hospitals should provide a surface spread of flame classification of Class 0 (European Class: B-s3,d2).

Note

The national classifications do not automatically equate with the equivalent European classifications; therefore, products cannot typically assume a European class unless they have been tested accordingly.

When a classification includes "s3,d2", this means that there is no limit set for the production and/or flaming droplets/particles.

Figure 16 Permitted unprotected area – method of determining the amount of unprotected area in an external wall (paragraph 6.67)

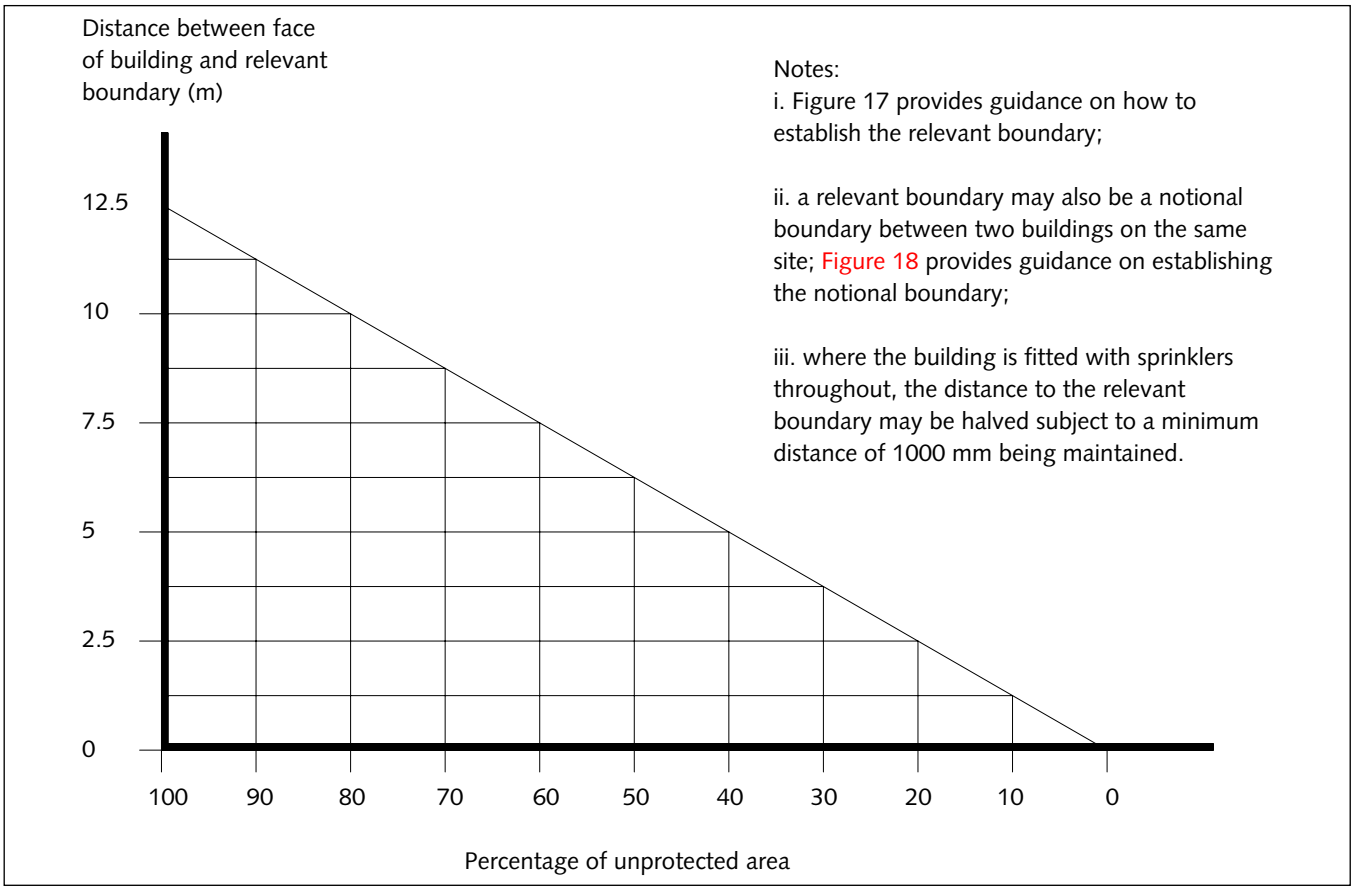


Figure 17 Relevant boundary area

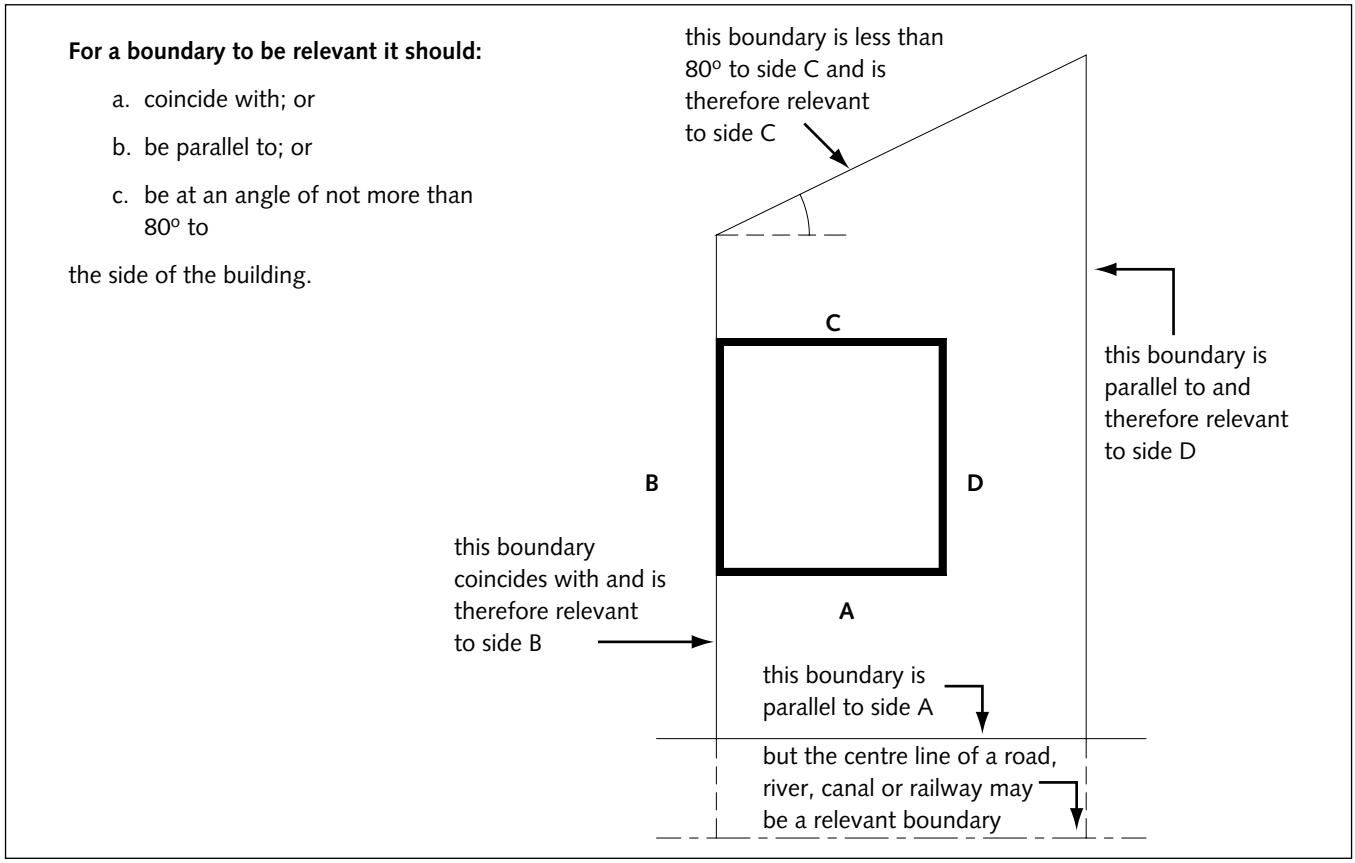
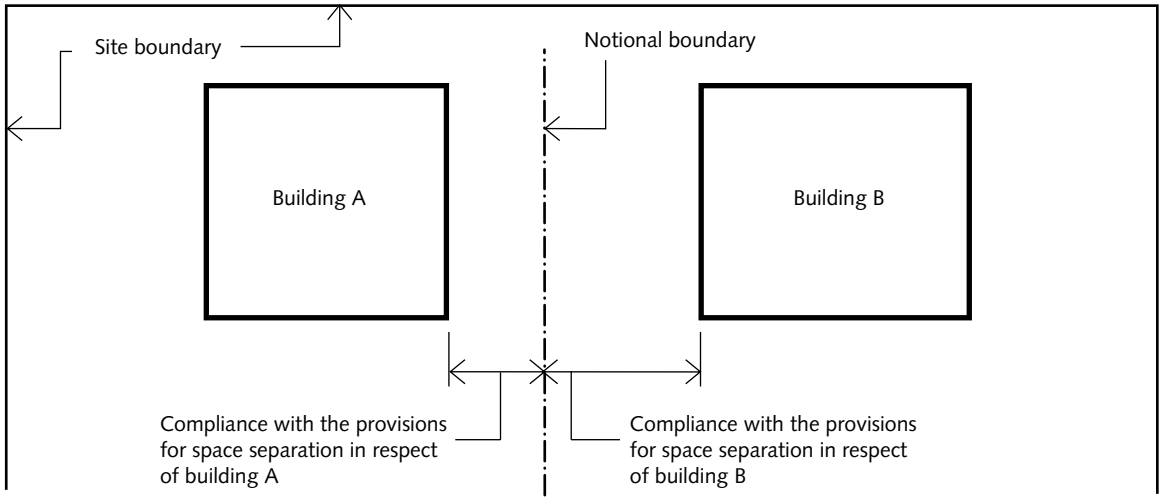


Figure 18 Notional boundary

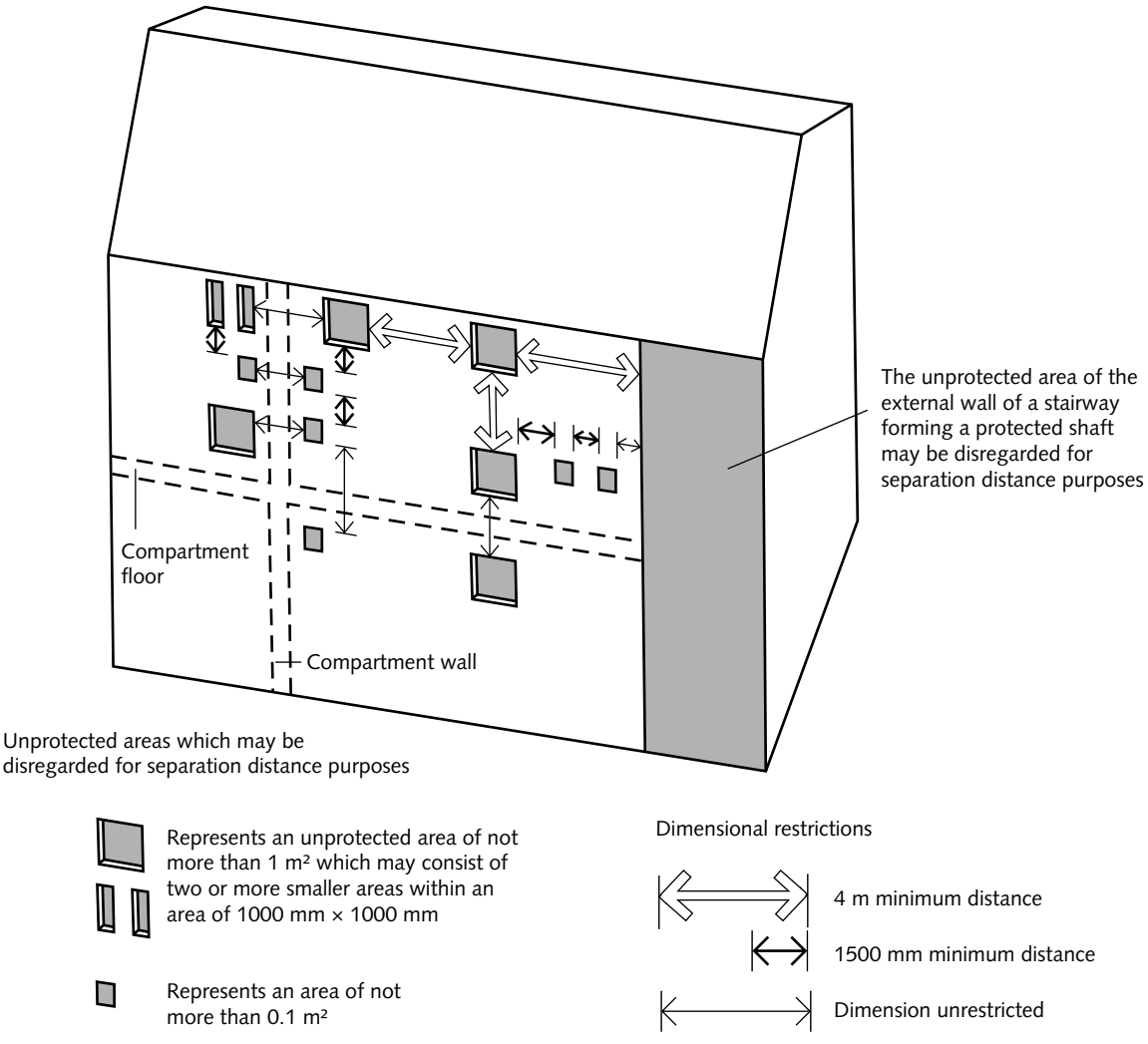


The notional boundary should be set in the area between the two buildings using the following rules:

1. The notional boundary is assumed to exist in the space between the buildings and is positioned so that one of the buildings would comply with the provisions for space separation having regard to the amount of its unprotected area. In practice, if one of the buildings is existing, the position of the boundary will be set by the space-separation factors for that building.
2. The siting of the new building, or the second building if both are new, can then be checked to see that it also complies, using the notional boundary as the relevant boundary for the second building.

For further information about notional boundaries, see paragraph 13.6 in Approved Document B.

Figure 19 Unprotected areas which may be disregarded in relation to space separation (paragraph 6.69)



Surfaces of roofs

6.72 All healthcare buildings providing in-patient facilities or invasive procedures should have roof coverings complying with the Approved Document B.

Junction of walls and low-level roofs

6.73 Where a roof abuts an external wall, the roof should provide a minimum period of fire resistance of 60 minutes (integrity and insulation) for a distance of 3000 mm from the wall (see Figure 20).

6.74 Where sprinklers are installed throughout the area below the low-level roof, paragraph 6.73 does not apply.

Junction of compartment and subcompartment walls and external walls

6.75 Where:

a. a compartment wall (or subcompartment wall) meets an external wall; or

b. a protected shaft meets an external wall,

a 1000 mm wide storey-height strip of external wall that has a similar period of fire resistance should be provided to prevent lateral fire spread (see Figure 21).

6.76 Where sprinklers are installed on both sides of the compartment (subcompartment wall), paragraph 6.75 does not apply.

Additional requirements for the operation of HVAC systems

Design of HVAC systems

6.77 Ventilation is used extensively in healthcare premises for primary patient treatment in operating departments, critical care areas and isolation rooms. It is also installed to ensure compliance with quality assurance of manufactured items in pharmacy and sterile services departments and to protect staff from harmful organisms and toxic substances (for example in laboratories). Guidance on the general design of ventilation systems is available in Health Technical Memorandum 2025 – 'Ventilation in healthcare premises' (soon to be replaced by Health

Figure 20 Fire resistance at junction of external walls and low-level roofs (paragraph 6.73)

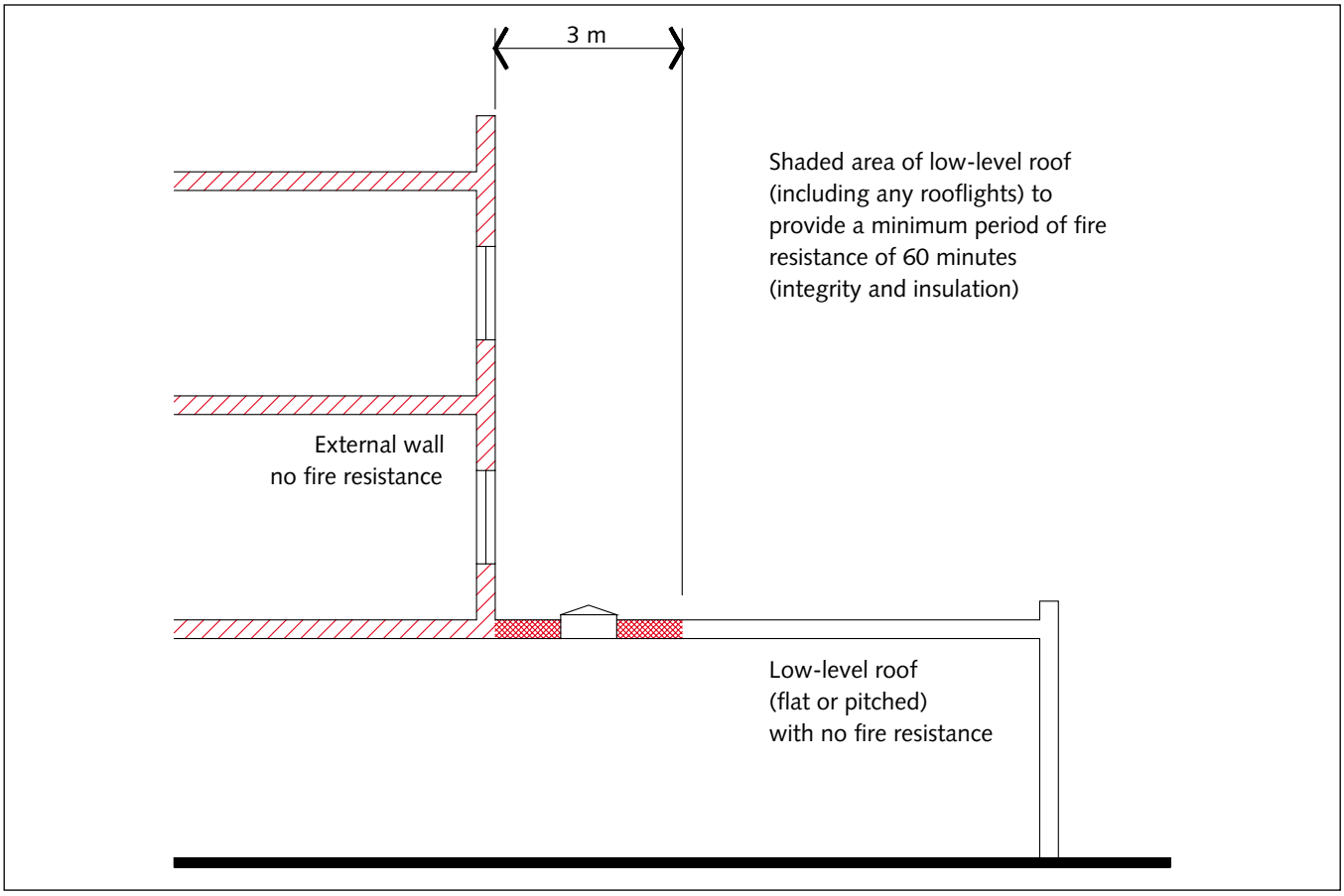
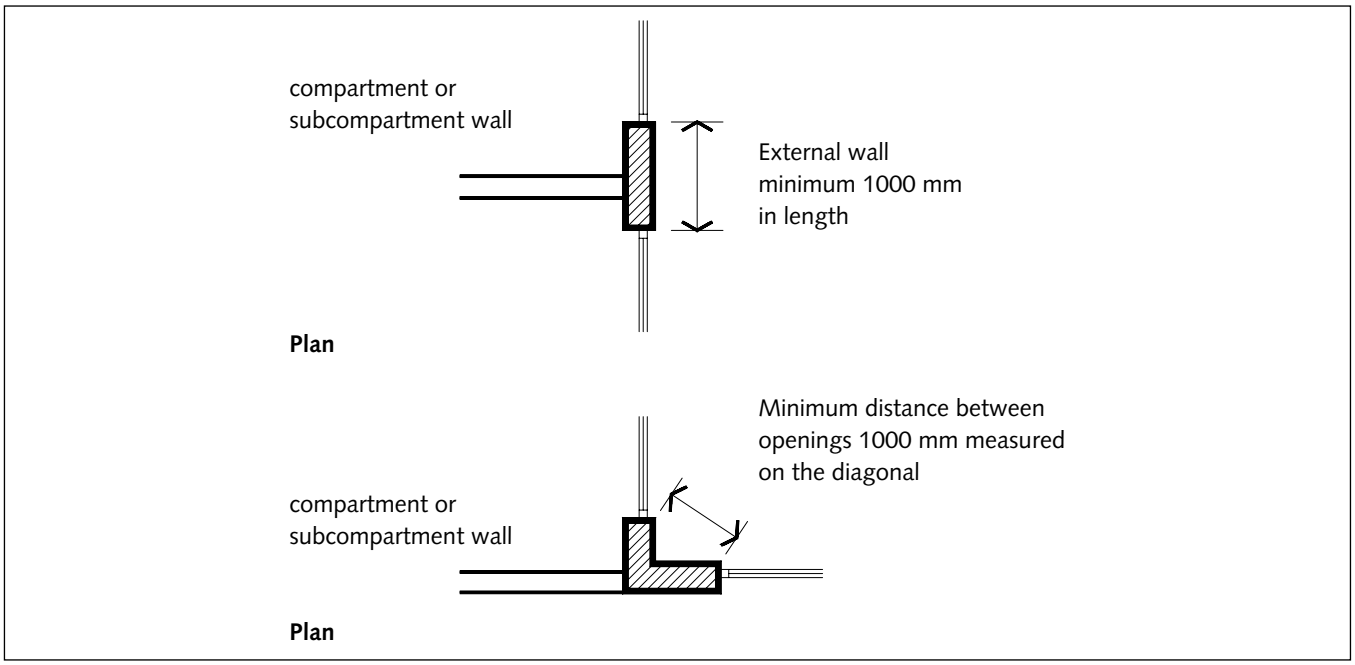


Figure 21 Junction of compartment or subcompartment walls with external walls (paragraph 6.75)



Technical Memorandum 03-01 – 'Specialised ventilation for healthcare premises').

6.78 In the event of a fire, large quantities of smoke and toxic gases can be given off, which potentially could be transferred through the ductwork to rooms and areas remote from the fire. Therefore measures are required to:

a. prevent a fire from entering or leaving the ductwork;

b. limit the spread of fire, smoke and other products of combustion within the ductwork;

c. prevent a breach in the integrity of an enclosing fire-resisting element of construction where penetrated by ductwork.

6.79 Ventilation systems should be designed and installed to comply with Health Technical Memorandum 2025 – 'Ventilation in healthcare premises' (soon to be replaced by Health Technical Memorandum 03-01 – 'Specialised ventilation for healthcare premises') and BS 5588-9.

6.80 Ventilation systems should not be common to both patient areas and hazard departments. Fresh-air intakes should be positioned to avoid the possibility of the intake of smoke and toxic gases.

Location and operation of fire dampers

6.81 Fire dampers in ductwork passing through compartment walls should be actuated:

a. in accordance with BS 5588-9; and

b. by the operation of the alarm and detection system in the compartments either side of the compartment wall.

6.82 In subcompartment walls, dampers activated by a suitable thermal release device set at 74°C may be used (see Figure 10).

Operation of ventilation plant

6.83 The ventilation plant should not be automatically shut down on the operation of the automatic fire alarm and detection system.

6.84 The shut-down of the system should be under the instruction of the fire-and-rescue service and should be controlled from panels located either at department entrances or adjacent to the main fire-alarm indicator panels.

Additional requirements for car parks

6.85 Buildings or parts of buildings used as parking for cars and other light vehicles have a well-defined fire load which is not particularly high.

6.86 There is some evidence that fire spread is unlikely from vehicle to vehicle. Additionally, where the car park is well ventilated, there is a low probability of fire spread from one storey to another.

6.87 Ventilation is the important factor, and as heat and smoke cannot be dissipated so readily from a car

park that is not open-sided, fewer concessions are made. The guidance in paragraphs 6.90–6.93 is concerned with three ventilation methods: open-sided (high level of natural ventilation), natural ventilation, and mechanical ventilation.

6.88 Where it is proposed to include car parking under any part of the hospital, the following additional requirements should be provided.

All car parks

6.89 Access from the car park to a healthcare building should be through a protected lobby. In addition, vertical access from the car park to the building should be via a stairway or stairways, provided with protected lobbies, serving the car-park storeys and providing access to one storey only of the building.

Open-sided car parks

6.90 If the building, or separated part containing the car park, complies with the following provisions, it may be regarded as an open-sided car park for the purposes of fire resistance assessment in Table A2 of Approved Document B – 'Fire safety'. The provisions are that:

a. there should not be any basement storeys;

b. each storey should be naturally ventilated by permanent openings at each car parking level, having an aggregate vent area not less than 1/20th of the floor area at that level, of which at least half (1/40th) should be equally provided between two opposing walls (where one element of structure supports or carries or gives stability to another, the fire resistance of the supporting element should be no less than the minimum period of fire resistance for the other element (whether that other element is load-bearing or not));

c. if the building is also used for any other purpose, the part forming the car park is a separated part and the fire resistance of any element of structure that supports or carries or gives stability to another element in the other part of the building should be no less than the minimum period of fire resistance for the elements it supports;

d. all materials used in the construction of the building, compartment or separated part should be non-combustible, except for:

(i) any surface finish applied to a floor or roof of the car park, or within any adjoining building, compartment or separated part to the structure enclosing the car park, if the finish meets all relevant aspects of the guidance on requirements B2 and B4 of Approved Document B;

(ii) any fire door;

(iii) any attendant's kiosk not exceeding 15 m^2 in area; and

(iv) any shop mobility facility.

Car parks which are not open-sided

6.91 Where car parks do not have the standard of ventilation set out in paragraph 6.90, they are not regarded as open-sided and a different standard of fire resistance is necessary (the relevant provisions are given in Table A2 of Approved Document B. Such car parks still require some ventilation, which may be by natural or mechanical means, as described in paragraphs 6.92 or 6.93. The provisions of paragraph 6.90 apply to all car-park buildings, whatever standard of ventilation is provided.

Natural ventilation

6.92 Where car parks that are not open-sided are provided with some, more limited, natural ventilation, each storey should be ventilated by permanent openings (which can be at ceiling level) at each car-parking level. These should have an aggregate free-vent area of not less than 1/40th of the floor area at that level, of which at least half should be split equally (1/160th on each side) and provided between two opposing walls (see Approved Document F – 'Ventilation' for additional guidance on normal ventilation of car parks).

Mechanical ventilation

6.93 In most basement car parks, and in enclosed car parks, it may not be possible to obtain the minimum standard of natural ventilation openings set out in paragraph 6.92. In such cases a system of mechanical ventilation should be provided as follows:

a. the system should be independent of any other ventilating system (other than any system providing normal ventilation to the car park) and be designed to operate at ten air changes per hour in a fire condition (see Approved

Document F – 'Ventilation' for guidance on normal ventilation of car parks);

b. the system should be designed to run in two parts, each part capable of extracting 50% of the rates set out in (a) above, and designed so that each part may operate singly or simultaneously;

c. each part of the system should have an independent power supply that would operate in the event of failure of the main supply;

d. extract points should be arranged so that 50% of the outlets are at high level and 50% at low level;

e. the fans should be rated to run at 300°C for a minimum of 60 minutes, and the ductwork and fixings should be constructed of materials having a melting point not less than 800°C.

For further information on equipment for removing hot smoke, refer to BS EN 12101-3:2002.

An alternative method of providing smoke ventilation from enclosed car parks is given in the BRE Report 368: 'Design methodologies for smoke and heat exhaust ventilation'.

Sprinklers

6.94 With the exception of buildings over 30 m in height, the guidance in this document does not require the installation of sprinklers in patient care areas of healthcare buildings. However, the design team is expected to consider the advantages that might be gained by installing life-safety sprinklers throughout the building. Any decision should be considered as an integral part of the fire safety strategy and should clarify the decision to select low or ordinary hazard. However, sprinklers or automatic fire suppression should be installed in commercial enterprise areas in accordance with Health Technical Memorandum 05-03: Part D – 'Commercial enterprises on healthcare premises'.

6.95 A sprinkler has two functions:

a. to detect a fire at an early stage; and

b. to distribute water on the fire area in order to limit or extinguish the fire.

6.96 Life-safety systems are defined in BS EN 12845 as "sprinkler systems forming an integral part of measures required for the protection of life".

6.97 The performance of life-safety sprinklers can be enhanced by the specification and installation of quick-response sprinkler heads that enable the activation of the system quickly after the heads have reached their operating temperature. This response is quicker than conventional heads that have been developed for property protection.

Note

The time interval for the sprinkler head to reach its operating temperature and the release of water through the system is dependent on the thermal inertia of the head. The degree of thermal inertia in the head is determined by the sensitivity of the head. The sensitivity of the sprinkler head is expressed by its response time index (RTI); this is a constant, independent of gas temperature and velocity. Quick-response sprinkler heads have a very low RTI value when compared to an average soldered-strut type or the 8 mm glass-bulb type. The quick-response head will react more quickly to a given fire because of its lower thermal inertia, even though the nominal temperature of operation is the same as the other sprinkler heads.

6.98 Where a sprinkler system is specifically recommended within this document, it should be provided in the building or separated part and designed and installed in accordance with either:

a. the requirements of BS 5306-2, including the relevant hazard classification together with the additional requirements for life safety; or

b. the requirements of BS EN 12845, including the relevant hazard classification together with the special requirements for life safety systems.

Note

Any sprinkler system installed to satisfy the requirements of this Health Technical Memorandum or Part B of the Building Regulations should be regarded as a life-safety system. However, there may be some circumstances where a particular life-safety requirement specified in BS 5306-2 or BS EN 12845 is inappropriate or unnecessary.

6.99 Water supplies for non-residential sprinkler systems should consist of either:

- systems designed and installed to BS 5306-2; or
- systems designed and installed to BS EN 12845.

Systems designed and installed to BS 5306-2

6.100 These systems consist of either:

a. two single water supplies complying with BS 5306-2, clause 13.1.2, where each is independent of the other; or

b. two stored water supplies, where:

(i) gravity or suction tanks should be either Type A, Type D or their equivalent (see BS 5306-2, clause 17.4.11.6); and

(ii) any pump arrangements should comply with BS 5306-2, clause 17.4.1.5; and

(iii) the capacity of each tank should be equivalent to at least half the specified minimum water volume of a single full capacity tank, as appropriate to the hazard; or

(iv) one tank should be equivalent to half the specified water volume of a single full capacity tank and the other should not be less than half the minimum volume of a reduced capacity tank (see BS 5306-2, Table 25), as appropriate to the hazard.

Note

The requirements for inflow should be met.

6.101 Whichever water storage arrangement is used at (iii) or (iv) above, the total design capacity of the water supply, including any inflow for a reduced capacity tank, should be at least equivalent to a single full capacity tank complying with Tables 21–24 of BS 5306-2, as appropriate to the hazard and pipework design.

Systems designed and installed to BS EN 12845

6.102 These systems consist of either:

a. two single water supplies complying with BS EN 12845, clause 9.6.1, where each is independent of the other; or

b. two stored water supplies, where:

(i) gravity or suction tanks should satisfy the all requirements of BS EN 12845, clause 9.6.2 b) other than capacity; and

(ii) any pump arrangements should comply with BS EN 12845, clause 10.2; and

(iii) the capacity of each tank is equivalent to half the specified minimum water volume of a single full capacity tank, as appropriate to the hazard; or

(iv) one tank should be at least equivalent to half the specified water volume of a single full capacity tank and the other should not be less than the minimum volume of a reduced capacity tank (see BS EN 12845, clause 9.3.40), as appropriate to the hazard.

Note

The requirement for inflow should be met.

6.103 Whichever water storage arrangement is used at (iii) or (iv) above, the total capacity of the water supply, including any inflow for a reduced capacity tank, should be at least equivalent to a single full capacity tank complying with BS EN 12845, Tables 9 and 10 or clause 9.3.2.3, as appropriate to the hazard and pipework design.

6.104 Where pumps are used to draw water from two tanks, each pump should be arranged to draw water from either tank and arranged so that any one pump or either tank could be isolated.

6.105 The sprinkler water supplies should generally not be used as connections for other services or other fixed fire-fighting systems.

6.106 In patient-access areas of hospitals, the sprinkler system should be a life-safety system, fitted with quick-response heads as defined in the Fire Protection Association's 'LPC rules for automatic sprinkler installations'.

6.107 Areas of the building not provided with sprinkler protection should be separated from those areas that are protected, by the provision of 60-minute fire-resisting structure (integrity and insulation).

Effect on other fire precautions

6.108 In those parts of healthcare buildings where sprinkler systems are provided, the effect of sprinklers on the overall package of fire precautions has to be considered to ensure that a cost-effective fire safety strategy is provided. Where sprinklers are installed in healthcare premises in accordance with the above guidance, some of the requirements of this document may be modified to take account of the effect of sprinkler operation at an early stage of fire development.

6.109 Where sprinklers are installed, the guidance may be modified subject to a suitable and sufficient risk assessment being undertaken and the information being recorded in the fire safety manual. Examples include:

- progressive horizontal evacuation (paragraphs 5.4–5.11);
- glazing in subcompartment walls (paragraphs 5.29–5.31);
- elements of structure (paragraphs 6.2–6.4 and 6.10);
- compartmentation (paragraphs 6.5–6.11);
- fire hazard rooms and areas (paragraphs 6.28–6.34);
- external fire spread (paragraphs 6.63–6.76);
- number and location of fire-fighting shafts (paragraphs 7.19 and 7.20).

7 Fire extinguishment

Principle

7.1 The design and construction of healthcare buildings should ensure that fires can be extinguished effectively and quickly by the occupants or by the emergency services. Adequate provision should be made around the building and within the site to enable fire appliances to gain access to the building.

7.2 The fire-and-rescue service, once alerted, will attend quickly and, once there, should be provided with adequate facilities to ensure the protection of life and property. Particular matters which require consideration are:

a. site access;

b. vehicular access around the buildings for fire appliances;

c. access into the building for the fire-fighting personnel;

d. the provision of fire mains within the building;

e. private fire hydrants;

f. venting for heat and smoke from basement areas.

Site access

7.3 When considering site access for the fire-and-rescue service, the following should be considered:

a. the location and number of site access points;

b. the design of the internal roadways with respect to width, radii of bends, gradients, clearance between and under buildings;

c. the weight and turning circle of the fire appliances.

7.4 Health Building Note 45 – 'External works for health buildings' provides guidance on the design and construction of hospital roads.

7.5 A minimum of two access points to the site, suitable for use by the fire-and-rescue service, should be provided for fire appliances. Their location should be agreed with all relevant authorities.

7.6 New hospital roads which may be used by fire appliances should comply with the guidance in Health Building Note 45 and that in Table 7 of this Health Technical Memorandum. One access point for the fire-and-rescue service may be an emergency access point dedicated solely for the use of the fire service.

Access around the building

7.7 Access around a healthcare building is required to enable high-reach appliances to be used where necessary, and to enable pumping appliances to supply water and equipment for fire-fighting and rescue activities.

7.8 Where access is provided to an elevation in accordance with Table 6, overhead obstructions should be avoided in the zone indicated in Figure 22.

7.9 Turning facilities should be provided in any dead-end route that is more than 20 m long. This can be by hammerhead or turning circle, designed on the basis of Table 7 and Figure 23.

7.10 Access for fire appliances to healthcare buildings not fitted with internal fire mains should comply with the guidance in Table 6.

Access and facilities for the fire service

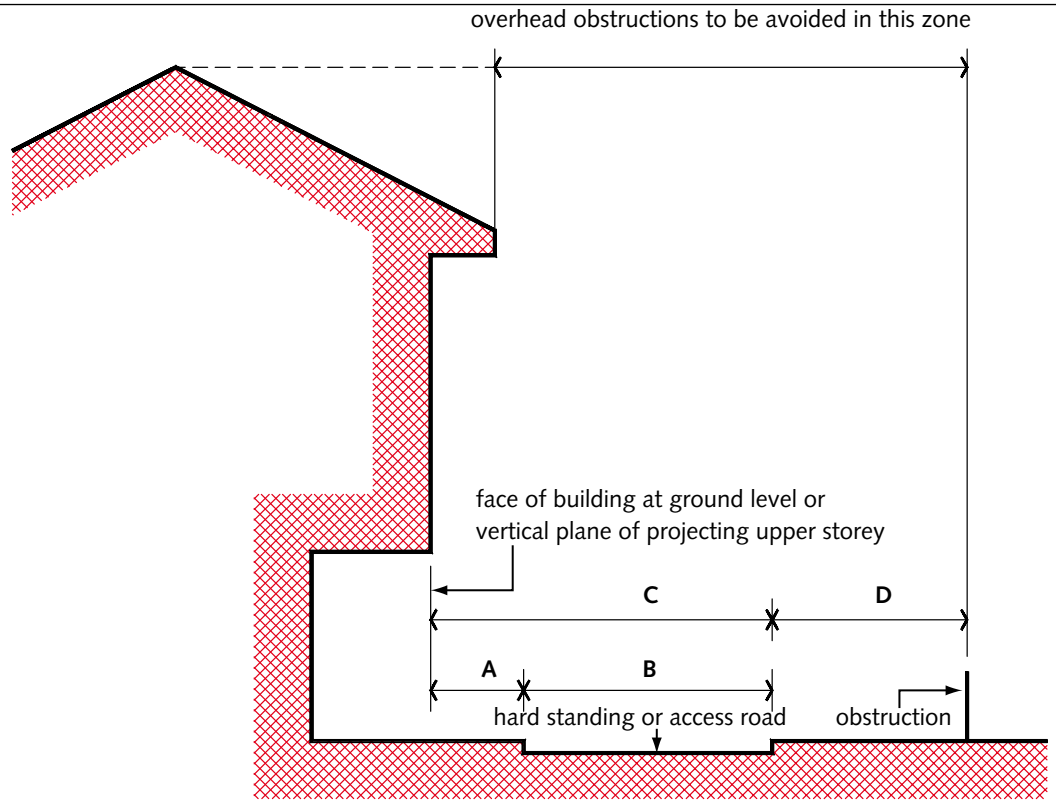
7.11 In low-rise buildings without deep basements, the needs of fire service access will be met by a combination of the normal means of escape, and the measures required for vehicular access around the building.

7.12 The requirements for additional facilities for the fire-and-rescue service are determined by:

a. the height of the building;

b. the depth of basements;

Figure 22 Relationship between building and access roads or hard standings for high-reach appliances (paragraph 7.8)



	Type of appliance	
	Turntable ladder Dimension (m)	Hydraulic platform Dimension (m)
A. Maximum distance of near edge of hard standing from building	4.9	2.0
B. Minimum width of hard standing	5.0	5.5
C. Minimum distance of further edge of hard standing from building	10.0	7.5
D. Minimum width of unobstructed space (for swing of appliance platform)	N/A	2.2

Note:
1. Hard standing for high-reach appliances should be as level as possible and should not exceed a gradient of 1 in 12.

2. Fire appliances are not standardised. Some fire services have appliances with a greater weight or different size. In consultation with the fire-and-rescue authority, the building control body should adopt the relevant dimensions and ground-loading capacity.

c. floor area;

d. the provision of hospital streets.

7.13 The additional facilities which may be required are:

a. fire mains;

b. fire-fighting shafts;

c. fire hydrants.

Healthcare buildings (including hospitals) not provided with hospital streets

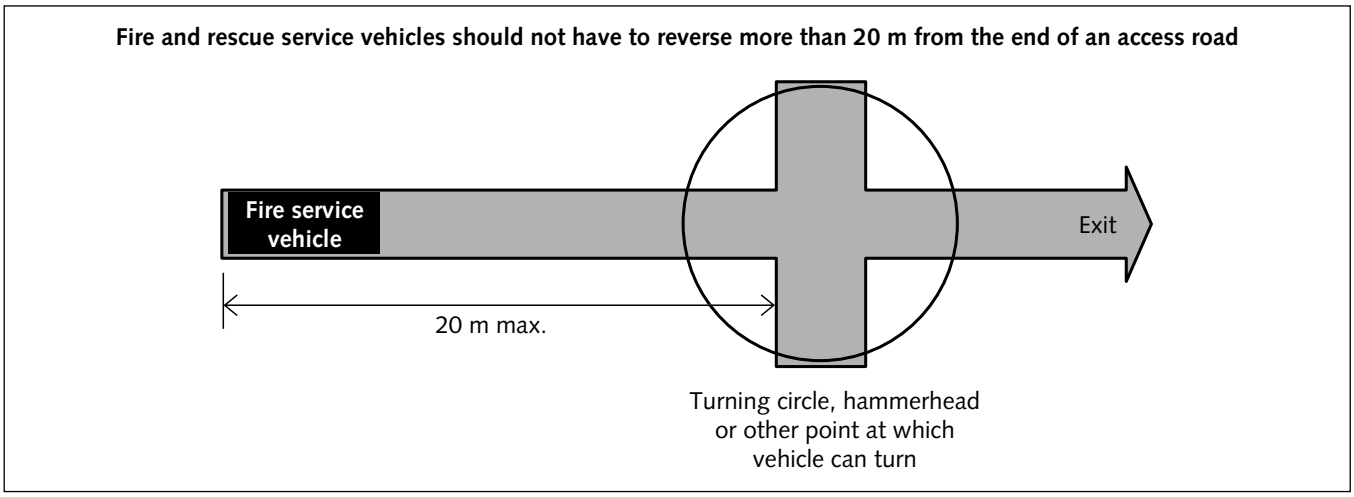
7.14 Healthcare buildings with five or more storeys, or with a basement at more than 10 m below ground

Table 6 Fire-and-rescue-service access around hospitals not fitted with fire mains

Total floor area (m²)	Height above ground of top storey (m)	Provide vehicle access to:	Type of appliance
Up to 2000	Up to 9	Within 45 m	Pump
	Over 9	15% of perimeter	High-reach
2000 to 8000	Up to 9	15% of perimeter	Pump
	Over 9	50% of perimeter	High-reach
8000 to 16,000	Up to 9	50% of perimeter	Pump
	Over 9	50% of perimeter	High-reach
16,000 to 24,000	Up to 9	75% of perimeter	Pump
	Over 9	75% of perimeter	High-reach
Over 24,000	Up to 9	100% of perimeter	Pump
	Over 9	100% of perimeter	High-reach

Note: The total floor area is the aggregate of all floors within the building.

Figure 23 Turning facilities



or fire-service access level should be provided with fire-fighting shafts containing fire-fighting lifts, regardless of the occupancy of the uppermost floor (see Figure 24).

7.15 Four-storey healthcare buildings with a storey of 600 m² or more should be provided with fire-fighting shaft(s) which need not include fire-fighting lifts, regardless of the occupancy of the uppermost floor (see Figure 24).

Note

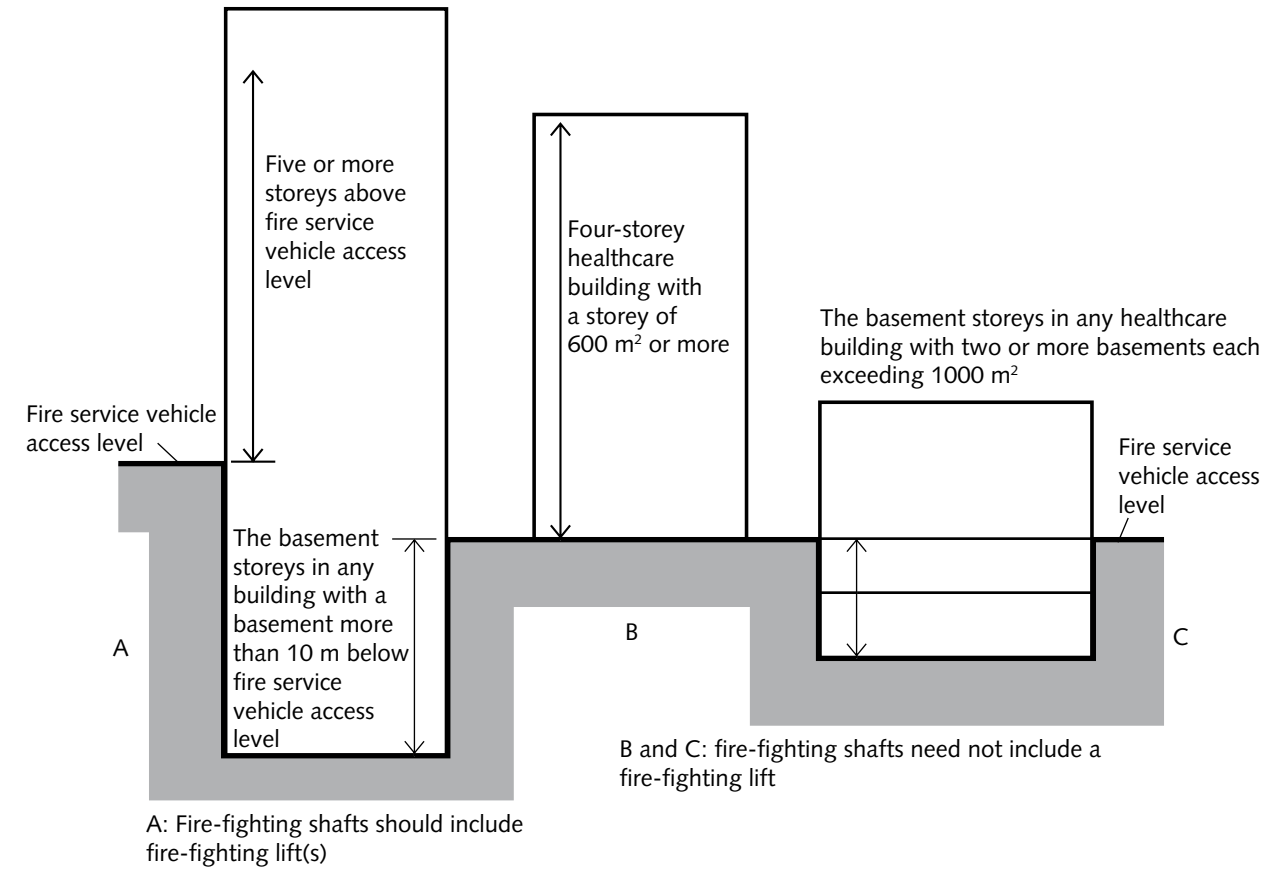
For further guidance on measuring the height of a building, reference should be made to Appendix C of Approved Document B ('Fire safety'). To count the number of storeys in a building, count only at the position which gives the greatest number.

7.16 Healthcare buildings with two or more basement storeys, each exceeding 1000 m² in area, should be provided with fire-fighting shaft(s) which need not include fire-fighting lifts.

7.17 Access for fire appliances where dry fire mains are provided should be within 18 m of each fire main inlet connection point. The inlet should be visible from the appliance.

7.18 Access for fire appliances where wet mains are provided should be to within 18 m and within sight of a suitable entrance giving access to the main, and in sight of the inlet for the emergency replenishment of the suction tank for the main.

Figure 24 Provision of fire-fighting shafts and fire-fighting lifts (paragraphs 7.14–7.16)



Note: Height excludes any top storey(s) consisting exclusively of plantrooms

Table 7 Typical vehicle access route specification

Appliance type	Minimum width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	12.5
High-reach	3.7	3.1	26.0	29.0	4.0	17.0

Notes

1. Fire appliances are not standardised. Some fire services have appliances of greater weight or different size. In consultation with the fire-and-rescue authority, the building control body may adopt other dimensions in such circumstances.
2. Because the weight of high-reach appliances is distributed over a number of axles, it is considered that their infrequent use of a carriageway or route designed to 12.5 tonnes should not cause damage. It would therefore be reasonable to design the road base to 12.5 tonnes, although structures such as bridges should have the full 17-tonne capacity.

Number and location of fire-fighting shafts

7.19 The number of fire-fighting shafts required should be such that there is at least one for every 1000 m² of floor area (or part thereof). If the building is fitted with sprinklers and is five or more storeys high, a minimum of two shafts should be provided, with an extra fire-fighting shaft for every additional 1500 m² (or part thereof) when the floor area exceeds 2000 m².

7.20 Fire-fighting shafts should be located to meet the maximum hose distances set out below, and at least two should be provided in buildings with a storey of 1000 m² or more in area, where the floor is at a height of more than 18 m above fire-service-vehicle access level:

a. if the building is fitted throughout with an automatic sprinkler system, sufficient fire-fighting shafts should be provided such that every part of every storey that is more than 18 m above fire-service-vehicle access level should be no more than 60 m from a fire main outlet in a fire-fighting shaft or hospital street, measured on a route suitable for laying hose;

b. if the building is not fitted with sprinklers, every part of every storey that is more than 18 m above fire-service-vehicle access level should be no more than 45 m from a fire main outlet contained in a protected stairway and 60 m from a fire main in a fire-fighting shaft or hospital street, measured on a route suitable for laying hose.

Note

In order to meet the 45 m hose criterion, it may be necessary to provide additional fire mains in escape stairs. This does not imply that these stairs should otherwise be designed as fire-fighting shafts.

Design and construction of fire-fighting shafts

7.21 Fire-fighting stairways and lifts should be approached from inside the building through a fire-fighting lobby.

7.22 Fire-fighting shafts should be equipped with fire mains having outlet connections and valves in every fire-fighting lobby except at access level.

7.23 Where fire-fighting shafts include fire-fighting lifts, a fire-fighting lift installation includes:

- the lift car itself;
- the lift well; and
- the lift machinery space together with the lift control system and the lift communications system.

The shaft should be constructed generally in accordance with clauses 7 and 8 of BS 5588-5. Fire-fighting lift installations should conform to BS EN 81-72 and to BS EN 81-1 or BS EN 81-2 as appropriate for the particular type of lift.

Hospitals provided with a hospital street

7.24 Fire-fighting shafts are not required in hospitals provided with hospital streets. There should be a stairway within 15 m of all final exits, which are themselves within 18 m of a suitable fire service access point.

7.25 All hospital streets should have fire main outlets located at department entrances so that every part of every storey is no more than 60 m from a fire outlet connection, measured along a route that is suitable for laying hose.

7.26 In hospitals five or more storeys high, or hospitals with a basement at more than 10 m below ground or fire service access level, lifts for use by the fire-and-rescue service are required. These should be:

a. located within the hospital street immediately adjacent to a stairway;

b. accessed directly off the hospital street; and

c. within 18 m of an entrance suitable for use by the fire-and-rescue service.

Note

The fire-and-rescue service should be consulted on any additional requirements they require for the lift to be suitable.

Fire mains

7.27 A fire main should be located in every fire-fighting shaft (see paragraph 7.22) or as required by paragraph 7.25. Where this is provided in lieu of access, a fire main should be provided in protected shafts and be no more than 45 m from any point.

7.28 In hospitals with a floor over 50 m above ground or access level, wet rising mains should be provided. Where fire mains are provided in hospitals which are lower than this, either wet or dry mains are suitable.

7.29 Wet or dry fire mains should be designed and installed in accordance with BS 9990:2006.

Provision of fire hydrants

7.30 Where a building that has any compartment of 280 m^2 or more is being erected more than 100 m from an existing fire hydrant, additional hydrants should be provided:

a. **buildings provided with fire mains** – hydrants should be provided within 100 m of any dry rising main inlet;

b. **buildings not provided with fire mains** – hydrants should be provided within 75 m of any point on the perimeter of the building.

Each fire hydrant should be clearly indicated by a plate, affixed nearby in a conspicuous position, in accordance with BS 3251.

7.31 Where no piped water supply is available or there is insufficient pressure and flow in the water main or an alternative arrangement is proposed, the alternative source of supply should be provided in accordance with the following recommendations:

a. a charged static water tank of at least 45,000 L capacity; or

b. a spring, river, canal or pond capable of providing or storing at least 45,000 L of water at all times of the year, to which access, space and a hard standing are available for a pumping appliance; or

c. any other means of providing a water supply for fire-fighting operations considered appropriate by the fire-and-rescue authority.

Note

The above guidance has been introduced to ensure that adequate water supplies are provided for those buildings which are not constructed within easy access of public hydrants.

First-aid fire-fighting equipment

7.32 First-aid fire-fighting equipment should be provided in accordance with BS 5306-8. Guidance on the means of extinguishing various classes of fire is provided in Firecode: Health Technical Memorandum 05-03: Part A – 'Fire safety in healthcare premises: General fire precautions' (formerly Health Technical Memorandum 83).

7.33 Hand-held extinguishers, fire blankets and hose reels should be provided as necessary.

7.34 Portable extinguishers should comply with BS EN 3, Parts 3, 6 and 7, and BS 7863:1996 and be inspected and maintained in accordance with BS 5306-3.

7.35 Hose reel installations, if provided, should conform to the relevant section of BS 5306-1.

Venting of basements

7.36 In addition to the measures above, there may be a need in case of fire to remove heat and smoke from basements. In a fire involving a basement, the products of combustion tend to escape via stairways, making access difficult for the fire-and-rescue service. Venting can reduce this problem, improve visibility and lower temperatures, making access for the fire service less difficult.

7.37 Smoke outlets provide a route for heat and smoke to escape to the open air from the basement level(s). They can also be used by the fire service to let cooler air into the basement.

7.38 Smoke outlets connected directly to the open air should be provided from every basement storey, except for any basement storey which:

a. has a floor area of less than 200 m^2;

b. is not more than 3000 mm below the adjacent ground level.

7.39 Smoke outlets should:

a. be positioned at high level in the space they serve;

b. be evenly distributed around the perimeter of the building;

c. discharge into the open air outside the building.

7.40 In each basement compartment/subcompartment, the combined cross-sectional area of all smoke outlets should be not less than 2.5% of the compartment/subcompartment floor area.

7.41 If the outlet terminates at a point that is not readily accessible, it should be kept unobstructed and covered with a metal grille or louvre.

7.42 If the outlet terminates at a point which is readily accessible, it may be covered by a suitably indicated panel or pavement light which can be broken out or opened.

7.43 Outlets should not prejudice the use of escape routes.

Mechanical smoke extract

7.44 As an alternative to natural venting, providing the basement is fitted with a sprinkler system to BS EN 12845, a mechanical extract system may be provided.

7.45 The air extraction system should provide at least ten air changes per hour and be capable of handling gas temperatures of up to 400°C for not less than one hour. It should come into operation automatically on the activation of:

a. the sprinkler system; and/or

b. the fire detection and alarm system.

Construction of outlet ducts and shafts

7.46 Outlet ducts and shafts, including any bulkheads over them, should be enclosed in non-combustible fire-resisting construction.

7.47 Where there are natural smoke outlet shafts from different basement compartments of the same basement storey, or from different basement storeys, they should be separated from each other by non-combustible fire-resisting construction.

Appendix A – Periods of fire resistance

A1 The performance of those elements of the building which are required to achieve a specified period of fire resistance is determined by reference to BS 476-20–24:1987. Performance is assessed against one or more of the following criteria:

a. resistance to collapse (load-bearing capacity), which applies to load-bearing elements;

b. resistance to fire penetration (integrity), which applies to fire-separating elements; and

c. resistance to the transfer of excessive heat (insulation), which applies to fire-separating elements.

A2 Table A1 summarises the specific requirements for each element in terms of the three performance requirements above.

A3 A suspended ceiling should not be relied upon to contribute to the fire resistance of a compartment floor.

Table A1 Specific periods of fire resistance for building elements

Part of building	Minimum provisions when tested to the relevant part of BS 476[1] (minutes)			Minimum provisions when tested to the relevant European standard[3] (minutes)	Method of exposure
	Load-bearing capacity[2]	Integrity	Insulation		
Structural frame, beam or column	See Table 2	Not applicable	Not applicable	R (see Table 2)	Exposed faces
Load-bearing wall	See Table 2	Not applicable	Not applicable	R (see Table 2)	Each side separately
Compartment floor [4,5]	60	60	60	REI 60	From the underside
Compartment wall[6]	Not applicable	60[7]	60[7]	REI 60	Each side separately
Single-storey buildings		30	30	REI 30	
Subcompartment wall[6]	Not applicable	30	30	EI 30	Each side separately
Wall to a fire hazard room	Not applicable	30	30	REI 30	Each side separately
Protected shaft	60	60	60	REI 60	Each side separately
Fire-fighting shafts	120	120	120	REI 120	From side remote from shaft
1. construction separating the shaft from the building	60	60	60	REI 60	From shaft side
2. construction separating fire-fighting stairway from the fire-fighting lift shaft and fire-fighting lift lobby	60	60	60	REI 60	Each side separately

Part of building	Minimum provisions when tested to the relevant part of BS 476[1] (minutes)			Minimum provisions when tested to the relevant European standard[3] (minutes)	Method of exposure
	Load-bearing capacity[2]	Integrity	Insulation		
Cavity barrier[8]	Not applicable	30	15	EI 30	Each side separately
Fire-resisting ceiling as described in paragraphs 5.23 and 6.30	Not applicable	30	30	E 30	From below

Notes:

1. BS 476-21 for load-bearing elements; BS 476-22 for non-load-bearing elements; BS 476-23 for fire-protecting suspended ceilings; and BS 476-24 for ventilation ducts.
   BS 476-8 results are acceptable for items tested or assessed before 1 January 1988.
2. Applies to load-bearing elements only (see B3.ii and Appendix E of Approved Document B).
3. The national classifications do not automatically equate with the equivalent classifications in the European column; therefore, products cannot typically assume a European class unless they have been tested accordingly.
   - "R" is the European classification of the resistance to fire performance in respect of load-bearing capacity;
   - "E" is the European classification of the resistance to fire performance in respect of integrity; and
   - "I" is the European classification of the resistance to fire performance in respect of insulation.
4. See Table 2 for floors that are over 12 m and 30 m above ground level.
5. Guidance on increasing the fire resistance of existing timber floors is given in BRE Digest 208 – 'Increasing the fire resistance of existing timber floors'.
6. Except for any limitations on glazed elements.
7. May be reduced if sprinklers are installed.
8. For the purposes of meeting the Building Regulations, cavity barriers will be deemed to have satisfied the provisions above, provided that they achieve an integrity requirement of at least 30 minutes and an insulation requirement of at least 15 minutes.

Appendix B – Doors and doorsets

B1 Fire doors should have the appropriate performance as indicated in Table B1. In the table the doors are identified by their performance under BS 476-22 in terms of integrity for a period of minutes (for example FD30). A suffix (S) is added for doors where restricted smoke leakage at ambient temperatures is needed. Unless pressurisation techniques complying with BS EN 12101-6:2005 are used, doors with the suffix "S" should also have a leakage rate not exceeding 3 m^3/m/hour (head and jambs only) when tested at 25 Pa under BS 476-31.1. The method of test exposure is from each side of the doors separately, except in the case of lift doors, which are tested from the landing side only.

Table B1 Location of fire doors

Location of door	Minimum period of fire resistance in terms of integrity (minutes) when tested to BS 476-22[1]	Minimum period of fire resistance in terms of integrity (minutes) when tested to European standards[2]
Subcompartment wall (doors require integrity performance)	FD30S	E30 S_a
Fire hazard rooms	FD30S	E30 S_a
In a compartment wall (doors require integrity performance)	FD30S – Single-storey healthcare buildings	E30 S_a
	FD30S – Storeys up to 12 m above ground in healthcare buildings fitted with sprinklers	E30 S_a
	FD60S – elsewhere	E60 S_a
To a protected shaft containing a lift, or stairway or escalator (doors require integrity performance):		
a. Accessed from a hospital street	FD30S	E30 S_a
b. Elsewhere	FD30S to each of the two sets of doors to the lobby	E30 S_a
To a protected shaft containing chutes, ducts and pipes (doors require integrity performance)	FD60S	E60 S_a
Within a cavity barrier	FD30*	E30 S

Notes:

1. To BS 476-22 (or BS 476-8 subject to paragraph 5 in Appendix A of Approved Document B).
2. The national classifications do not automatically equate with the equivalent classifications in the European column; therefore, products cannot typically assume a European class unless they have been tested accordingly.

Unless pressurization techniques complying with BS EN 12101-6:2005 are used, all these doors (except those marked *) should also either:

(a) have a leakage rate not exceeding 3 m^3/m/hour (head and jambs only) when tested at 25 Pa under BS 476-31.1; or

(b) meet the additional classification requirement of S_a when tested to BS EN 1634-3.

Door closers

B2 With the exception of fire doors to patients' bedrooms in mental health accommodation, and doors which are kept locked shut, fire doors should be fitted with an automatic self-closing device complying with BS EN 1154 or BS EN 1634-1.

B3 With the exception of doors to stairways, it may be acceptable for fire doors to be held open on electrically operated door-release mechanisms provided that all of the following criteria can be satisfied:

a. the door-release mechanism should conform to BS 5839-3:1988 and be fail-safe (that is, in the event of a fault or loss of power, the release mechanism should be triggered automatically);

b. all doors fitted with automatic door releases should be linked to the fire detection and alarm system;

c. all automatic door releases within a compartment/subcompartment should be triggered by all of the following:

(i) the actuation of any automatic fire detector within the compartment;

(ii) the actuation of any manual fire-alarm call point within the compartment;

(iii) any fault in the fire warning system within the compartment;

(iv) any loss of power to the fire warning system;

d. automatic door releases must be provided with a ready means of manual operation from a position at the door;

e. each door fitted with an automatic door release should be closed at a predetermined time each night and remain closed throughout sleeping hours. If for reasons of management this is impracticable, it should be the specific responsibility of the fire warden (or other nominated member of staff) to operate the release mechanism at least once a week to ensure that:

(i) the mechanism is working effectively;

(ii) the doors close effectively onto their frames.

Transfer grilles

B4 Air-transfer grilles that are not designed to prevent the spread of fire and cold smoke should not be fitted in fire (and smoke) rated doors. Fire doors should not be undercut and, where practicable, should be fitted with low resistance threshold seals.

Identification

B5 All fire doors, including each leaf of double doors, should be provided with an identification disc. The disc should be a minimum of 45 mm in diameter, clearly indicating the fire-resisting standard of the door (for example FD30, FD30S, FD60 etc).

Doors on escape routes

B6 Fire doors on escape routes should be side-hung or pivoted. Revolving doors should be avoided, but where they are used, they must easily convert to outward-opening doors; or there should be outward-opening doors adjacent to the revolving door, capable of allowing safe egress for the numbers of persons likely to use them. Turnstiles and shutters are not acceptable on escape routes and should not be used.

B7 Sliding doors are acceptable on escape routes provided they convert to outward-opening doors when subjected to reasonable pressure from any direction. In the case of powered sliding doors, they should in addition be provided with a monitoring system to ensure that they fail-safe to the fully open position in the event of a power failure.

B8 Door swings should not obstruct the circulation space or the escape route's designed width. However, doors to cupboards etc that are normally locked may open onto circulation routes, but it is recommended that such doors should open through 180° to avoid obstruction.

B9 Fire doors across escape routes providing alternative means of escape must be double-swing, and those across escape routes providing single direction of escape should open in the direction of escape.

B10 Fire-exit doors to rooms containing more than 30 people should open outwards from the room.

B11 Fire doors across circulation routes should be fitted with glazed observation panels to the upper part of the door.

B12 Additional guidance on the specification of doors and doorsets is available in Health Technical Memorandum 58 – 'Internal doorsets'.

Appendix C – Thermoplastic materials

C1 A thermoplastic material means any synthetic polymeric material which has a softening point below 200°C if tested to BS EN ISO 306:2004. Specimens for this test may be fabricated from the original polymer where the thickness of material of the end product is less than 2.5 mm.

C2 A thermoplastic material in isolation cannot be assumed to protect a substrate when used as a lining to a wall or ceiling. The surface rating of both products must therefore meet the required classification. If, however, the thermoplastic material is fully bonded to a non-thermoplastic substrate, only the surface rating of the composite will need to comply.

C3 Concessions are made for thermoplastic materials used for windows, roof lights and lighting diffusers. They are described in paragraphs 6.56–6.62.

C4 For the purposes of paragraphs 6.51–6.62, either:

- thermoplastic materials should be used according to their classification 0–3 under the tests in BS 476-6 and BS 476-7 (if they have such a rating); or
- they may be classified TP(a) rigid, TP(a) flexible, or TP(b) according to the following methods.

TP(a) rigid

a. rigid solid pvc sheet;

b. solid (as distinct from double- or multi-skinned) polycarbonate sheet at least 3 mm thick;

c. multi-skinned rigid sheet made from unplasticised pvc or polycarbonate which has Class 1 rating when tested to BS 476-7:1971 or 1987;

d. any other rigid thermoplastic product, a specimen of which when tested to BS EN ISO 306:2004 performs so that the test flame extinguishes before the first mark, and the duration of flaming or afterglow does not exceed five seconds following removal of the burner.

TP(a) flexible

These are flexible products not more than 1 mm thick which comply with the Type C requirements of BS 5867-2 when tested to BS 5438, Test 2, 1989, with the flame applied to the surface of the specimens for five, 15, 20 and 30 seconds respectively, but excluding the cleansing procedure.

TP(b)

a. rigid solid polycarbonate sheet products less than 3 mm thick, or multi-skinned polycarbonate sheet products which do not qualify as TP(a) by test; or

b. other products which, when a specimen of the material between 1.5 and 3 mm thick is tested in accordance with BS EN ISO 306:2004, have a rate of burning that does not exceed 50 mm/minute. (If it is not possible to cut or machine a 3 mm thick specimen from the product, a 3 mm test specimen can be moulded from the same material as that used for the manufacture of the product.)

Appendix D – Fixing of fire dampers

D1 All fire dampers should be installed so that they maintain their integrity against the passage of fire for the required period of fire resistance. A fire damper should be adequately fixed into, or to, the construction it is protecting. A fire damper that is supported only by the ductwork in which it is located, or by timber battens, frames or other methods that do not provide the fire resistance required, is not acceptable.

D2 Fire dampers provided in 30-minute fire-resisting ceilings should be adequately supported either by the ceiling or from the structural soffit. In the ceiling situation, it is also essential to ensure that the integrity of the fire-resisting ceiling is maintained. It is not acceptable to form an opening, install a diffuser or grille and fit a fire damper above if the gap between the ceiling opening and the fire damper does not achieve 30 minutes' fire resistance.

Appendix E – Construction and fixing of cavity barriers

E1 Every cavity barrier should be constructed to provide at least 30 minutes' fire resistance except for a cavity barrier in a stud wall or partition which may be formed of:

a. steel at least 0.5 mm thick; or

b. timber at least 38 mm thick; or

c. polythene-sleeved mineral wool or mineral wool slab – in either case under compression when installed in the cavity; or

d. calcium silicate (cement-based or gypsum-based boards at least 12.5 mm thick).

E2 A cavity barrier may be formed by any construction provided for another purpose if it meets the provisions for cavity barriers.

E3 Cavity barriers should be tightly fitted to rigid construction and mechanically fixed in position wherever possible. Where this is not possible (for example in the case of a junction with slates, tiles, corrugated sheeting or similar materials), the junction should be fire-stopped.

E4 Cavity barriers should also be fixed so that their performance is unlikely to be made ineffective by:

a. movement of the building due to subsidence, shrinkage or temperature change, and movement of the external envelope due to wind;

b. collapse in a fire of any services penetrating them;

c. failure in a fire of their fixings;

d. failure in a fire of any material or construction which they abut. For example, if a suspended ceiling is continued over the top of a fire-resisting wall or partition, and direct connection is made between the ceiling and the cavity barrier above the line of the wall or partition, premature failure of the cavity barrier can occur when the ceiling collapses. However, this does not arise if the ceiling is designed to provide fire protection of 30 minutes or more.

Appendix F – Fire behaviour of insulating core panels

Introduction

F1 Insulating core panel systems are used for external cladding as well as for internal structures. However, while both types of panel system have unique fire behaviour characteristics, both can present particular problems with regard to fire spread.

F2 Panels typically consist of an inner core sandwiched between, and bonded to, a membrane such as facing sheets of galvanised steel. The panels are then formed into a structure by jointing systems, usually designed to provide an insulating and/or hygienic performance. The panel structure can be free-standing, but is usually attached to the building structure by lightweight fixings and hangers.

F3 The most common forms of insulation in present use are:

- expanded polystyrene;
- extruded polystyrene;
- polyurethane;
- mineral fibre.

F4 However, panels with the following core materials are also in use:

- polyisocyanurate;
- modified phenolic.

F5 Unlike other buildings, healthcare premises (in particular hospitals) often utilise progressive horizontal evacuation rather than total building evacuation. Selecting the appropriate insulated core products for internal walls or partitions, or for external cladding material, is vital for patient and building occupant safety.

Fire behaviour of the core materials and fixing systems

F6 The use of cladding panels for both internal or external walls can produce a significant risk to the occupants of healthcare buildings, in particular in-patients who may be dependent on staff for evacuation. In considering the use of such cladding, reference should be made to the requirements of Approved Document B. The panel in-fill material, when involved in a fire, should not compromise the safety of occupants remaining in the building either through fire or through smoke spread. Wherever possible, cladding with a non-combustible core should be used.

Design recommendations

F7 To identify the appropriate solution, a risk assessment approach should be adopted. This would involve identifying the potential fire risk within the enclosures formed by the panel systems and then adopting one or more of the following at the design stage:

- removing the risk;
- separating the risk from the panels by an appropriate distance;
- providing a fire suppression system for the risk;
- providing a fire suppression system for the enclosure;
- providing fire-resisting panels; and
- specifying appropriate materials/fixing and jointing systems.

F8 In summary, the performance of the building structure, including the insulating envelope, the superstructure, the substructure etc, must be considered in relation to their performance in the event of a fire.

Specifying panel core materials

F9 Where at all possible, the specification of panels with core materials appropriate to the application will help to ensure an acceptable level of performance for panel systems when involved in fire conditions.

F10 The following are examples of core materials that may be appropriate to the application concerned.

Mineral fibre cores

- cooking areas;
- hot areas;
- fire breaks in combustible panels;
- fire-stop panels;
- general fire protection;
- external cladding.

All cores

- chill stores;
- cold stores;
- clean rooms.

Note

Core materials may be used in other circumstances where a risk assessment has been made and other appropriate fire precautions have been put in place.

General

F11 Generally, panels or panel systems should not be used to support machinery or other permanent loads. Any cavity created by the arrangement of panels, their supporting structure or other building elements should be provided with suitable cavity barriers.

F12 Examples of possible solutions and general guidance on insulating core panels construction can be found in the International Association for Cold Storage Construction's (European Division) 'Design, construction, specification and fire management of insulated envelopes for temperature controlled environments'. While this document is primarily intended for use in relation to cold storage environments, the guidance, particularly in Chapter 8, is considered to be appropriate for most insulating core panel applications.

Appendix G – Fire strategy (including fire drawings)

Provision of information

G1 The following information should be provided to assist the responsible persons to operate, maintain and use the building in reasonable safety and to assist the eventual owner, occupier and/or employer to meet their statutory duties under the Regulatory Reform (Fire Safety) Order.

G2 This Appendix is only intended as a guide. For clarity, the guidance is given in terms of simple and complex buildings; however, the level of detail required will vary from building to building and should be considered on a case-by-case basis.

Simple buildings

G3 For most buildings, basic information on the location of fire protection measures may be all that is necessary. An as-built plan of the building should be provided showing:

a. escape routes;

b. compartmentation and separation (that is, location of fire-separating elements including cavity barriers in walk-in spaces);

c. fire doors, self-closing fire doors and other doors equipped with relevant hardware (for example panic locks);

d. locations of fire and/or smoke detector heads, alarm call-points, detection/alarm control boxes, alarm sounders, fire safety signage, emergency lighting, fire extinguishers, dry or wet risers and other fire-fighting equipment, and location of hydrants outside the building;

e. any sprinkler system(s), including isolating valves and control equipment;

f. any smoke-control system(s) (or ventilation system with a smoke-control function), including mode of operation and control systems;

g. any high-risk areas (for example heating machinery);

h. specifications of any fire safety equipment provided, in particular any routine maintenance schedules; and

j. any assumptions in the design of the fire safety arrangements regarding the management of the building.

Complex buildings

G4 For more complex buildings, a more detailed record of the fire safety strategy and procedures for operating and maintaining any fire protection measures of the building will be necessary. Further guidance is available in Health Technical Memorandum 05-01 – 'Managing healthcare fire safety' and BS 5588-12.

G5 These records should include:

a. the fire safety strategy, including all assumptions in the design of the fire safety systems (such as fire load), and any risk assessments or risk analysis;

b. all assumptions in the design of the fire safety arrangements regarding the management of the building;

c. escape routes, escape strategy (for example simultaneous or phased) and muster points;

d. details of all passive fire safety measures, including compartmentation (that is, location of fire-separating elements), cavity barriers, fire doors, self-closing fire doors and other doors equipped with relevant hardware (for example electronic security locks), duct dampers and fire shutters;

e. fire detector heads, smoke detector heads, alarm call-points, detection/alarm control boxes, alarm sounders, emergency communication systems, CCTV, fire safety signage, emergency lighting, fire extinguishers, dry or wet risers and other fire-fighting equipment, other interior facilities for the fire-and-rescue service, emergency control rooms, location of hydrants outside the

building, and other exterior facilities for the fire-and-rescue service;

f. details of all active fire safety measures, including:
   - sprinkler system(s) design, including isolating valves and control equipment; and
   - smoke-control system(s) (or HVAC system with a smoke-control function) design, including mode of operation and control systems;

j. any high-risk areas (for example heating machinery) and particular hazards;

k. as-built plans of the building showing the locations of the above;

m. specifications of any fire safety equipment provided, including operational details, operator manuals, software, system zoning, routine inspection, and testing and maintenance schedules. Records of any acceptance or commissioning tests;

n. any other details appropriate for the specific building.

Fire drawings

G6 To adequately assess the fire precautions at design stage, a set of fire drawings should be prepared using symbols based on BS 1635.

G7 In order to adequately assess compliance with the requirements of this guidance, the drawings should show in sufficient detail the detection and alarm systems, the means of escape, the structural fire precautions, the portable and fixed fire-fighting equipment, smoke control/ventilation arrangements, and access and facilities for the fire-and-rescue service.

G8 A typical set of fire drawings would comprise:

a. a location plan;

b. a site plan;

c. a floor plan of each storey, prepared at a scale of not less than 1:200;

d. a floor plan of each department, prepared at a scale of not less than 1:100 and preferably at a scale of 1:50;

e. a set of elevations.

G9 During the construction of a project, variations to the structure and the layout frequently occur; these variations should not subvert the integrity of the agreed fire precautions. The variations should be recorded on the fire plans so that on completion, an as-built set of drawings can be prepared.

G7 The as-built drawings should be held by the trust so that any proposed future alterations can be checked against the fire drawings to ensure that the integrity of fire safety is maintained in accordance with the recommendations in this document.

G8 This is an operational requirement and cannot be enforced through the current Building Regulations.

Fire-resisting glazing

G9 The fire safety manual for the building should also contain a material listing and performance specification for the glazed fire-resisting systems so that individual critical components (such as glass or glazing beads or seals) can be readily sourced when necessary.

G10 All fire-resisting glazed elements should have a permanent legible marking on the glass which is visible after glazing. As a minimum, this mark should include the manufacturer, the product name, fire-resistance rating and any requirement for impact safety performance in accordance with BS 6206 or BS EN 12600.

Appendix H – Specific considerations based on patient categories

Independent patients

H1 Areas containing independent patients or occupants who can escape from a fire unaided do not have such a reliance on horizontal evacuation, and therefore the need for compartmentation both horizontally and vertically is reduced.

H2 In most cases, the use of Approved Document B will be sufficient (purpose group 3, 4 or 5 depending on the type of premises). However, where doubt may exist about the mobility of patients, advice should be sought from clinicians to ensure that no part of patient care or treatment would prevent them from quickly responding in the event of a fire.

H3 Based on an assessment of each type of patient care, it may be necessary in some instances to apply the recommendations within this document in addition to those of Approved Document B.

Dependent patients

H4 The guidance in this document provides additional guidance above that of Approved Document B, which is necessary to meet the increased dependency of patients who fall within this category (and those within the very high dependency category). **Any future change in dependency is likely to result in a significant change to the fire precautions applicable. This applies equally to premises designed for independent patients.**

Additional guidance for mental health patients

H5 Patients may exhibit behavioural problems that could impact on the fire and security measures installed. Acute mental patients have a history of generating unwanted fire signals. Tampering with fire doors is commonplace, and special attention must be paid to final exits.

H6 The implications of this tampering are an increase in the number of false alarms and the potential for complacency amongst staff to the emergency signal. A security issue may also be created with regard to the control of patients and the possibility of unrestricted egress.

H7 The potential to configure the alarm and detection system, such that in the first instance only staff receive the alarm, can reduce adverse reactions from patients. A general alarm confined to the compartment or zone would only be activated as the evacuation strategy was implemented.

H8 Integration of the alarm and detection system with staff and patient monitoring and location systems can improve response times to alarm situations.

H9 For security purposes, it is paramount that final exits do not release immediately on actuation of the alarm. The release mechanism should form part of the overall strategy for managing the evacuation. This gives control to the staff and increases the security of the facility. Some means of control should be provided such that these doors can be opened by staff, on confirmation of the fire signal, when it becomes necessary to evacuate to a designated (secure) assembly point.

H10 Should it become necessary to evacuate an entire facility or part thereof, adequate safe and secure external assembly points should be available.

H11 Due to the intended occupancy, evacuation to an external assembly point would be a last resort only.

H12 Should a fire situation become sufficiently threatening to the occupants, and all other means of horizontal and vertical evacuation have been exhausted, it follows that patients may become more anxious during this period of heightened activity. Management and operational policy should ensure that the patients are adequately separated from the fire while they are being transferred to a secure area.

H13 When designing external escape routes that are intended for use by mental health patients, similar

considerations as above should be considered, with the additional caveat of any security measures required to ensure patient safety.

H14 Segregation of male and female, and other patient groups, is common on wards, often with patients rarely coming into contact while being treated within close proximity. Patients who ordinarily only interact with people in their immediate accommodation or ward area may react adversely to being made to assemble or evacuate with those who are unfamiliar. The whole spectrum of possible reactions could occur under these times of heightened activity and anxiety, and the extent to which these reactions could interfere with the evacuation could be severe. Staff who otherwise would be assisting patients to move away from the scene of the fire may be distracted by problematic patients' reactions, taking them away from their duties. Other patients could react adversely to further commotion caused by an individual's behaviour.

H15 It is important to realise that any segregation requirements needed for patients during the course of their treatment must be maintained in the event of a fire alert or instigation of an evacuation plan. An appreciation of the behavioural characteristics, and the impact they could have on a fire situation, is needed in order to modify designs accordingly.

H16 This need for segregation will have to be met throughout the evacuation, and the process needs to be managed to ensure common escape routes can be used safely without increasing the anxiety of the patient.

H17 The accommodation should be segregated into a number of different activities, each with their own particular needs. Therapeutic and day activities should be provided in central areas of the building separated from the sleeping accommodation, which is usually directly linked to it.

H18 The objective of day and night space separation is to reduce the risk to sleeping occupants, minimising the number of occupants required to move during the initial evacuation.

H19 Day spaces are considered high risk zones due to the transient nature of their use. To reduce the associated risk, a compartment should be subcompartmented to separate day and night spaces, as required by the fire risk assessment.

H20 Acute mental health provision should be restricted to ground-floor locations. Where this is not feasible, patient-access areas should be on floors no greater than 12 m above ground floor level (typically three floors). Where patient accommodation is provided above ground-floor level, adequate means for patient evacuation should be provided.

H21 It is important that, where stairwells are narrower than those recommended in Table 1 of HBN 40-02 Part C, they should not be reduced in width below the dimensions in paragraph 5.47.

Very high dependency patients

H22 In departments used as operating theatres and critical care areas etc, any movement or evacuation of patients may be life-threatening; consequently, additional precautions are required to address the implications of:

- fire and smoke in a compartment either adjacent or below;
- fire and smoke within the department itself.

H23 Due to the unique hazards posed by patients in this category, accommodation should ideally be restricted to ground-floor locations. Where this is not feasible, very high dependency patient areas should be on floors no greater than 12 m above ground-floor level (typically three floors). Where very high dependency patient accommodation is provided above ground-floor level, adequate means for patient evacuation should be provided.

H24 The enclosing of departments with fire-resisting construction and the strategic planning of adjacent compartments goes some way to mitigating the risk. The time required for evacuation is longer, as it is often necessary to move the patient, ventilators, monitoring equipment and support staff as one unit, and the design should seek to maximise the protection to the occupants allowing for extended start-up times.

H25 Some of the equipment, such as the ventilator, are integral parts of the anaesthesiologist's equipment and so are provided with an electrical back-up supply. However, this type of equipment is often large and unwieldy, and the evacuation must be pre-planned, as double doorsets are required to facilitate the efficient movement of ancillary equipment.

H26 The aim of any design should be to prevent a fire in an adjacent compartment either on the same storey or on a storey above or below, requiring the

evacuation of a critical care area. The compartmentation and HVAC systems should be designed so that an adequate period of time is provided to enable a fire to be detected and extinguished before it threatens occupants.

H27 The HVAC systems provided to critical care areas are designed so that the pressure within the department is maintained at slightly above that of the adjacent areas. In a fire emergency, the continuing operation of these systems will assist in preventing smoke and other products of combustion entering the critical care area.

H28 Although it is accepted that some occupants, because of their condition or treatment, should not be moved, provision must still be made for external evacuation. The need for a vertical movement strategy for such occupants must be recognised, and appropriate measures installed to reduce the risk associated with such an action.

H29 Protected lobbies are provided to those areas of the premises that require additional means to protect against the movement of smoke. Where risk assessment has demonstrated a need, very high dependency treatment areas should be provided with a lobby, which should be sized appropriately to fully accommodate a bed, the associated ancillary equipment and nursing staff, and include sufficient additional floor space to allow for any manoeuvring as necessary.

H30 Where smoke movement into an area accommodating very high dependency patients has been identified as a potential risk (that is, where no hospital streets have been provided), every door opening in the compartment wall should be provided with a protected lobby, each door of which will provide a minimum period of fire resistance of 30 minutes.

H31 Units accommodating very high dependency occupants should be divided into two subcompartments in order to separate the “nursing area” from the “utility area”.

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