

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

## Part 11: Code of practice for shops, offices, industrial, storage and other similar buildings

ICS 13.220.01; 91.040.20

## Committees responsible for this British Standard

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

Association of Building Engineers  
British Retail Consortium  
British Standards Society  
British Telecommunications plc  
Chartered Institution of Building Services Engineers  
Chief and Assistant Chief Fire Officers Association  
Consumer Policy Committee of BSI  
Department for Education  
Department of Health  
Department of the Environment — Building Research Establishment  
Department of the Environment — Construction Sponsorship Directorate  
Department of the Environment for Northern Ireland  
District Surveyors Association  
Electricity Association  
Fire Brigades Union  
Health and Safety Executive  
Home Office  
Institute of Building Control  
Institution of Gas Engineers  
Institution of Structural Engineers  
London Fire and Civil Defence Authority  
Loss Prevention Council  
National Association of Fire Officers  
Royal Institute of British Architects  
Scottish Office — Building Directorate  
Timber Research and Development Association

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Access Committee for England  
Association of British Theatre Technicians  
British Automatic Sprinkler Association  
British Woodworking Federation  
Cinema Exhibitors Association  
Flat Glass Manufacturers' Association  
Guild of Architectural Ironmongers  
Hevac Association  
Institute of Fire Safety  
Institution of Fire Engineers  
Intumescent Fire Seals Association  
National House-building Council  
Steel Window Association  
Theatres Advisory Council

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## Foreword

This Code of practice was prepared by Technical Committee FSH/14 Fire precautions in buildings and like structures. It incorporates revisions of BS 5588-2:1985 and BS 5588-3:1983, which are withdrawn.

All matters dealing with fire safety management are now located in BS 5588-12.

Other Parts of BS 5588 are as follows:

- *Part 0: Guide to fire safety codes of practice for particular premises/applications;*
- *Part 1: Code of practice for residential buildings;*
- *Part 4: Code of practice for smoke control using pressure differentials;*
- *Part 5: Code of practice for firefighting stairs and lifts;*
- *Part 6: Code of practice for places of assembly;*
- *Part 7: Code of practice for the incorporation of atria in buildings<sup>1)</sup>;*
- *Part 8: Code of practice for means of escape for disabled people;*
- *Part 9: Code of practice for ventilation and air conditioning ductwork;*
- *Part 10: Code of practice for shopping complexes;*
- *Part 12: Managing fire safety.*

Some of the more important changes from the text of Part 2 and Part 3 are as follows.

- a) Travel distances in ancillary accommodation are related to hazard.
- b) Stairs do not always need to be discounted when determining exit capacity.
- c) Guidance has been included on smoke ventilation measures to assist firefighting.
- d) Guidance has been included for phased evacuation procedures in office buildings.
- e) In Section 5, Section 6 and Section 7 the provisions relating to means of escape in case of fire, and those giving guidance on good practice, are dealt with separately.
- f) A different method for the calculation of stair widths for simultaneous evacuation is given in Table 4.

In this code a commentary on the relevant principles is followed by any recommendations that are made. The commentary is intended to provide an explanatory background to recommendations, especially if the recommendations might otherwise appear to be arbitrary.

NOTE 1 Commentary text is printed in italics.

In this code, normative reference is made to documents which are essential for the application of the code, (see **2.1**), informative reference is made to documents which provide information or guidance (see **2.2**). Some documents are called up normatively and informatively in different places in the text. Such documents are listed as normative references.

NOTE 2 Legislation is referred to informatively only, as the user of the standard is expected to obey the law, irrespective of compliance with standards.

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<sup>1)</sup> Footnote deleted

It has been assumed in the drafting of this code that the execution of its provisions will be entrusted to appropriately qualified and experienced people.

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

It should be noted that the guidance given in this code with regard to, among other things, the widths of escape routes, is based upon the standard widths necessary for means of escape and may not be the widths required to enable persons with disabilities, particularly those in wheelchairs, to have access to and move around buildings.

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

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

In particular, attention is drawn to 4.3.

### Summary of pages

This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 117 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Sidelining in this document indicates the most recent changes by amendment.



# Section 1. General

## 1 Scope

This Part of BS 5588 relates to the following buildings:

- a) shops and similar premises used for retail trade or business, including:
  - 1) large premises such as department stores, supermarkets and hypermarkets excepting communal parts of shopping complexes (which are covered by BS 5588-10);
  - 2) premises where goods may not necessarily be sold over the counter but in which a trade or business is carried out, such as hairdressers' salons, television rental shops and auction rooms;
  - 3) cafes, restaurants, public houses and other places of refreshment;
  - 4) premises where goods are received for treatment or repairs, such as dry cleaners, launderettes and shoe repair shops;
- b) office buildings and offices incorporated in premises of other uses;
- c) industrial buildings;
- d) storage buildings;
- e) similar buildings to those listed above including plant, but not buildings or parts of buildings used for assembly, or places of assembly;
- f) laboratories.

This Part of BS 5588 deals with planning, construction, and facilities for occupant safety in the event of fire by warning systems, limiting travel distances, the provision of protected escape routes and safe access for firefighting, in new buildings and in alterations and extensions to existing buildings. It includes measures and facilities necessary for restricting the spread of smoke and fire beyond the source, and to prevent the ingress of smoke and heat into protected escape routes by pressure differential systems or other means. It also makes specific recommendations in terms of protection, number and location of exits and those measures to assist fire fighting, providing guidance on suppression and controlled ventilation systems for smoke and heat clearance. The recommendations and guidance are intended to safeguard the lives of occupants in the event of fire, and could also protect the building and its contents against the effects of fire.

Advice for owners and managers is located in BS 5588-12.

This code does not address any additional requirements for process plant that may be made under specific legislation to guard against premature failure of such plant which might lead to an untenable escalation of the incident. Further guidance on this is given in BS 5908.

This code is not intended to apply to buildings during the course of construction. However, guidance is given on the necessary precautions to be taken during alterations to occupied buildings.

This Part of BS 5588 does not apply to those parts of hospital premises that are covered by Hospital Technical Memoranda, e.g. an office within a hospital. An office building or warehouse building on hospital premises is covered by this Part, [see items b) and d)].

## 2 References

### 2.1 Normative references

This Part of BS 5588 incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the cited publications are listed on pages 112 to 114. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this Part of BS 5588 only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

## 2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on pages 115 to 117, but reference should be made to the latest editions.

## 3 Definitions

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

### 3.1

#### **access room**

a room through which passes the only escape route from an inner room

### 3.2

#### **accommodation stair**

a stair, additional to that or those required for escape purposes, provided for the convenience of occupants

### 3.3

#### **ancillary accommodation**

all parts of the building that are ancillary to the main use of the building, such as rooms associated with engineering services, refuse rooms, and covered car parks

### 3.4

#### **atrium (plural atria)**

a space within a building, not necessarily vertically aligned, passing through one or more structural floors

NOTE Enclosed lift wells and escalator wells, building services ducts and stairways are not classified as atria.

### 3.5

#### **basement**

a storey that is below the ground storey (see 3.22)

### 3.6

#### **borrowed light**

light received from another room

### 3.7

#### **(fire) 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

### 3.8

#### **compartment floor/wall**

a fire resisting floor or wall used in the separation of one fire compartment from another

### 3.9

#### **dead end**

a place from which escape is possible in one direction only, or in directions less than 45° apart that are not separated by fire resisting construction

### 3.10

#### **depth (of a building)**

distance between the lowest point of the floor of the lowest storey of a building, to the ground level measured at the centre of that face of the building where the distance is greatest. (See Figure 1)

NOTE Ground level is the level of the footway or paving, if present, in front of the relevant face of the building.

### 3.11

#### **direct distance**

the shortest distance from any point within the floor area, measured within the external enclosures of the building, to the nearest storey exit, ignoring walls, partitions and fittings, other than the enclosing walls/partitions of protected stairways. (See Figure 2)

NOTE See also 3.40 travel distance.

**3.12****escape lighting**

lighting provided, for use when the supply to the normal lighting fails, to ensure that the escape routes are illuminated at all material times

**3.13****escape route**

a route forming part of the means of escape from any point in a building to a final exit (see **3.14**)

NOTE It might be necessary to pass through further doorways before reaching a place of safety, for example if escape were via an internal courtyard.

**3.14****final exit**

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

**3.15****fire alarm/fire detection zone**

a subdivision of the building such that the occurrence of a fire within it will be indicated by the fire alarm system separately from an indication of fire in any other subdivision

**3.16****fire door (assembly)**

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

**3.17****firefighting lift**

a lift designed to have additional protection against fire with controls that enable it to be used under the direction control of the fire service in fighting a fire

**3.18****firefighting lobby**

a protected lobby providing access from a firefighting stair to the accommodation area, and to any associated firefighting lift

**3.19****firefighting shaft**

a protected enclosure containing a firefighting stair, firefighting lobbies and, if provided, a firefighting lift together with its machine room

**3.20****firefighting stair**

a protected stairway communicating with the accommodation area only through a firefighting lobby

**3.21****fire resistance**

the ability of a component or construction of a building to satisfy for a stated period of time some or all of the appropriate criteria specified in the relevant Part of BS 476

NOTE See 13.3.

**3.22****ground storey**

a storey, the floor of which is situated at such a level or levels that any given point on its perimeter is at, or about, or not more than 1.2 m below, the level of the finished surface of the ground adjoining the building in the vicinity of that point

**3.23****height (of a building)**

the distance of the surface of the highest point of the floor of the highest storey (excluding any such storey consisting exclusively of plant rooms) measured at the centre of that face of the building where the measurement is greatest from the level of the footway or paving in front of that face, or if there is no such footway or paving, from the level of the ground (see Figure 1)

**3.24****inner room**

a room from which escape is possible only by passing through another room (the access room, see 3.1)

**3.25****material of limited combustibility**

one of the following:

- a) a non-combustible material; or
- b) any material of density  $300 \text{ kg/m}^3$  or more which, when tested in accordance with BS 476-11, does not flame and the rise in temperature on the furnace thermocouple is not more than  $20^\circ\text{C}$

**3.26****means of escape**

structural means whereby a safe route or routes is or are provided for persons to travel from any point in a building to a place of safety

**3.27****mezzanine**

a partial storey within another storey

NOTE In Scotland this is known as a "gallery".

**3.28****non-combustible material**

any material 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 the temperature on either the centre (specimen) or furnace thermocouples

**3.29****open storey (horizontal) planning**

planning where almost the whole floor area of a storey is undivided by partitions

**3.30****phased evacuation**

system of evacuation in which different parts of a premises are evacuated in a controlled sequence of phases, those parts of the premises expected to be at greatest risk being evacuated first

**3.31****place of safety**

place in which persons are in no danger from fire

**3.32****protected circuit**

an electrical circuit protected against external fire

**3.33****protected escape route**

that part of an escape route which comprises a protected lobby (see 3.34), protected corridor (see 3.34) or protected stairway (see 3.35)

**3.34****protected lobby/corridor**

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

**3.35****protected stairway**

a stair discharging through a final exit to a place of safety (including any exit passageway between the foot of the stair and the final exit) that is enclosed with fire resisting construction

**3.36****self-closing fire door**

a fire door (see 3.16) fitted with a device which fully closes the door overriding the resistance of any latch

**3.37****shopping complex**

a structural combination of a number of commercial premises that includes areas providing common access for the public, principally for shopping purposes

**3.38****special premises**

premises subject to the Fire Certificates (Special Premises) Regulations 1976 [1]

**3.39****storey exit**

a final exit (see 3.14), or doorway giving direct access to a protected stairway, firefighting lobby, or external escape route

**3.40****travel distance**

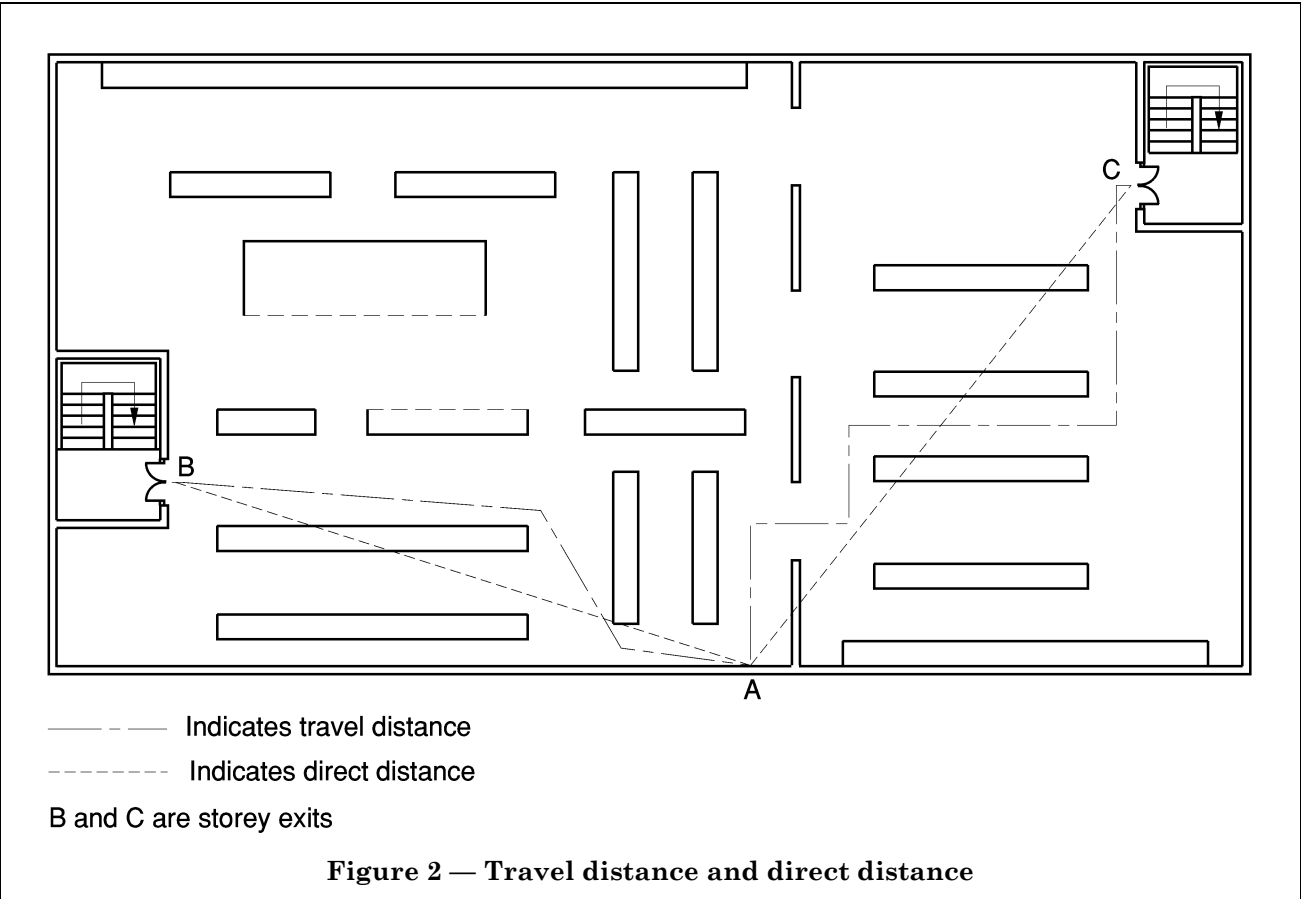
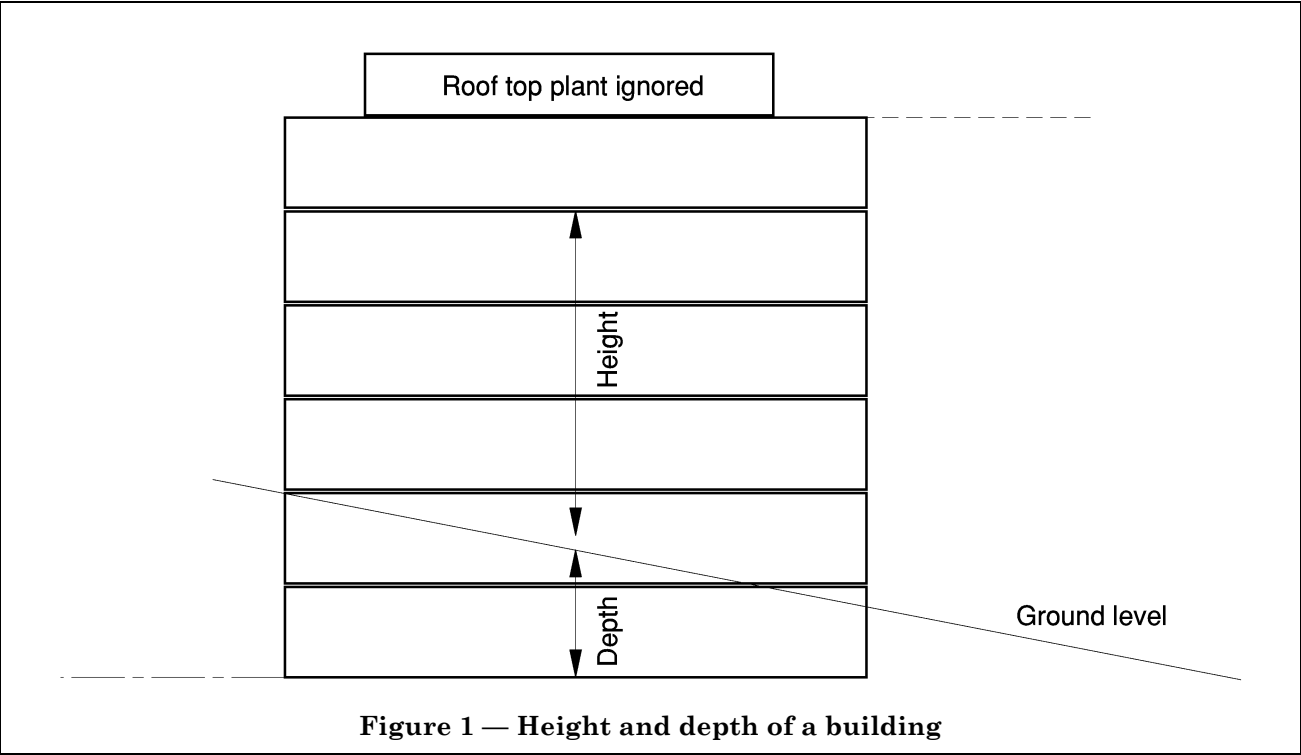
the actual distance to be travelled by a person from any point within the floor area to the nearest storey exit, having regard to the layout of walls, partitions and fittings (See Figure 2)

NOTE See also 3.11 direct distance.

**3.41****width**

- a) of a doorway. The clear width of the doorway when the door is open;
- b) of a corridor or other escape route. The clear width of the corridor or other escape route, measured at 1 500 mm above floor level, defined by walls or other fixed obstructions;
- c) of a stairway. The clear width of the stairway measured between the walls or balustrades maintained clear for a vertical distance of 2 m measured from the pitch line or landing floor level

NOTE All obstructions, i.e. door hardware, handrails and strings, which do not intrude more than 100 mm into these widths are disregarded.



## 4 Use of this code

### 4.1 Safety measures

The recommendations in this code are intended to provide safety from fire by promoting safe aspects of design, construction and management in the following areas:

- a) planning and protection of escape routes from any area that may be threatened by fire;
- b) construction and finishing with suitable materials and embodying fire resistance in the structure;
- c) segregation of high fire risk/hazard areas;
- d) fire warning systems and, where appropriate, systems for the automatic detection of fire;
- e) automatic fire extinguishing systems to limit the growth of fire;
- f) smoke control measures to maintain the effectiveness of escape routes and to assist fire fighters;
- g) the provision of firefighting equipment, whether for use by the staff in containing fire in its early stages, or by way of assistance to the fire service;
- h) the provision of reasonable access to the building for the fire service, including facilities for the safe and rapid extinction of fire by the fire service and for the safety of the fire service personnel when firefighting;
- i) effective management control.

### 4.2 Use of the principles and application of the recommendations

It is not possible to make comprehensive recommendations capable of covering every possible risk, and an intelligent appreciation of the principles and application of the recommendations of this code is therefore essential. The fire hazard of a particular type of building and its contents, and the kinds of occupant together with their likely state of awareness and/or distraction, have to be appreciated in the design of a building. To use this code effectively, the behaviour of a fire occurring anywhere in the building and the response from people thus put at risk has to be anticipated.

Individual recommendations of this code applied in isolation may give little or no benefit, and could even reduce the level of fire safety. Although the basic principles and recommendations for escape from floor areas are described in Section 3, the most conscientious application of these recommendations could be undermined unless supported by the necessary measures relating to construction, ancillary accommodation, engineering services, fire protection facilities and management set out in Section 4, Section 5, Section 6, Section 7 and BS 5588-12.

Although it is difficult to achieve a consistent standard of safety for buildings which vary in size, location, facilities and design, the adoption of certain arbitrary values ought to provide some guarantee of a basic standard of safety.

This approach does not, however, make allowance where buildings incorporate features that enhance some particular aspect of safety.

Therefore, an understanding and flexible use of the recommendations in this code is encouraged as it is not intended to enforce particular forms of design. However, it is particularly important that any variations from the code should be subject to a rigorous examination and justification.

### 4.3 Relationship with statutory provisions

#### 4.3.1 General

It is important to appreciate the relationships between this code and the various statutory provisions relevant to the design and construction of new buildings and to the fire precautions to be provided in existing buildings. The relevant legislation indicated in general terms in 4.3.2 and 4.3.3 has to be complied with in the event of a conflict with this code. However, there are two main ways in which this code is intended to supplement the legislation. The first is that, since Acts and Regulations are necessarily drafted in broad terms and cannot deal in detail with a wide variety of different situations, one of the objects of this code is to provide guidance for the building designer in matters not covered in sufficient detail by the legislation. Secondly, because the objectives of the legislation are mainly concerned with the health and safety of the general public, this code is of wider scope and includes matters relevant to the protection of the building and its contents from fire as well as the safety of the occupants.

It is advisable that there should be preliminary design consultation to avoid the need to make changes to a design at a late stage. For England and Wales, reference should be made to the guidance document *Building Regulation and Fire Safety, Procedural Guidance* [2]. For Scotland, reference should be made to the Building (Procedure) (Scotland) Regulations 1981 [3] and the Building (Procedure) (Scotland) Amendment Regulations 1990 [4].

#### **4.3.2 Building regulations**

The design and construction of new buildings, and alterations of existing buildings, are controlled by the following statutory provisions collectively referred to as building regulations in this code.

England and Wales: The Building Regulations

Scotland: The Building Standards (Scotland) Regulations

Northern Ireland: The Building Regulations (Northern Ireland)

#### **4.3.3 Legislation and other regulations for fire safety in shops, offices, industrial, storage and other similar buildings**

In addition to the controls mentioned in 4.3.2, fire safety and means of escape for a wide variety of buildings is dealt with principally under the following legislation.

England and Wales:

The Fire Precautions Act 1971, as amended by the Health and Safety at Work etc. Act 1974 and the Fire Safety and Safety of Places of Sport Act 1987.

The Building Act 1984.

The Fire Certificates (Special Premises) Regulations 1976 (as amended).

Scotland:

The Fire Precautions Act 1971, as amended by the Health and Safety at Work etc. Act 1974 and the Fire Safety and Safety of Places of Sport Act 1987.

The Building (Scotland) Act 1959 (as amended).

The Fire Certificates (Special Premises) Regulations 1976, (as amended).

Northern Ireland:

The Fire Services (Northern Ireland) Order 1984 and the Health and Safety at Work (Northern Ireland) Order 1978.

The Planning and Building Regulations (Amendment) (Northern Ireland) Order 1990.

There are also a number of local Acts as well as entertainment and other licensing legislation which deal with fire safety and means of escape. The designer should consult the fire authority and building authority at an early stage to make certain that the building as planned will meet the requirements those authorities may make, particularly if a fire certificate or licence may be necessary.

NOTE 1 Under the Fire Precautions Act 1971, fire authorities cannot require structural or other alterations relating to escape from the premises as a condition of the issue of a fire certificate, or under an improvement notice, if the plans of the building comply with building regulations, unless:

- a) there are regulations made under Section 12 of the Act and it is necessary to make requirements in order to satisfy those regulations; or
- b) the fire authority is satisfied that the means of escape in case of fire are inadequate by reason of matters or circumstances of which particulars were not required to be supplied to the local authority in connection with the deposit of plans for building regulation purposes.

NOTE 2 If a building is in a low category of hazard, the designer and owner should be aware that a change of use could cause the building to be placed in a higher category of hazard and have to comply with more onerous requirements.

#### 4.4 Protection of property

Fire safety is often interpreted as meaning only the safety of persons (life safety), but it also includes the protection of property (property safety). For property safety a different level of protection is usually required than for life safety purposes alone, where the evacuation time for persons to reach safety is as short as possible.

Fire safety requirements imposed in connection with building regulations are limited to health and safety, e.g. The Building Regulations 1991 for England and Wales state that “Parts A to K and N of Schedule 1 shall not require anything to be done except for the purpose of securing reasonable standards of health and safety for persons in or about buildings (and any others who may be affected by buildings, or matters connected with buildings)”. Even so, some life safety measures may also contribute to property protection.

Property protection includes the building and its contents, hence a higher level of fire resisting separation and greater compartmentation than recommended in this code may be required to minimize loss or damage. As well as passive protection (see Section 3, Section 4 and Section 5), active protection (see Section 7) should be considered. The level of active protection required will depend upon the nature and quantity of the contents and may contribute to life safety protection. Both passive and active protection will assist firefighters. For these reasons it is strongly recommended that the insurers be consulted at the design stage.

#### 4.5 Diagrams

The figures in this code are intended to clarify concepts, and should not be taken as indicating the only acceptable forms of planning. Features not relevant to the concepts or principle(s) being illustrated are not shown.



## Section 2. Analysis of the problem

### 5 Planning in relation to fire

#### 5.1 Spread of fire

A common basis of designing means of escape from fire lies in the identification of the possible sources of outbreak of fire and the evaluation of the manner in which it is likely to develop, and the routes smoke and hot gases might take through the building and how these may affect the process of evacuation.

Fires do not normally start in two different places in a building (unless arson is involved). Initially, a fire will create a hazard only in the part in which it starts and is unlikely to involve a large area. Subsequently, it may spread to other parts, usually along circulation routes.

In buildings designed, maintained and supervised in accordance with this code, the risk of fire starting in passages, corridors, lobbies or stairways intended for use only for access or means of escape may be regarded as low as long as they are kept clear of combustibles, and convenient protected storage space is provided so that circulation spaces are not used for storage purposes. It is also unlikely that fire will originate in the structure itself. Outbreak of fire is more likely to occur in furnishings, decorations, finished goods, raw materials and/or chemicals, equipment, process plant or service plant in the building, and the point of origin is therefore likely to be in display areas, factory areas, store rooms/areas, kitchens or offices, or possibly in the service installations.

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

Once ignited, combustible products give off hot smoke-laden and toxic gases. Deflection and radiation also occur rapidly and, because of the extremely high temperature of the gases, other combustible materials and products within the area of the fire will ignite more easily, further accelerating the progress of the fire.

It cannot be assumed that the effects of the fire will be confined to the space in which it originated. If the enclosing walls have no fire resistance or do not form a fire-tight joint with a fire resisting floor (or ceiling) above, the fire will soon penetrate at ceiling level, where the attack from the flames or hot gases is most severe, to the adjoining space. Even with fire resisting construction, the buoyancy and expansion of the fire gases can cause them to be driven out of the space to affect other parts of the building.

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

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

#### 5.2 Smoke

In the early stages of a fire, the most important effects will usually be those of smoke and other products of combustion. Often smoke will be the first evidence of fire detectable by the occupants and is thus likely to be the first cause of alarm. When first present, smoke tends (in the absence of any strong air currents) to collect at ceiling level, filling the space from the top downwards. When it extends down to head height it will produce difficulty in breathing and impair visibility, which will interfere with the efforts of occupants to find their way towards the exits. The extremely hot, smoke-laden and toxic gases will add considerably to their difficulties. People who are prevented from escaping by dense smoke, or who are unduly retarded from escaping by it, may suffer from the toxic effects of the products of combustion that accompany the smoke, the asphyxiant effect caused by lack of oxygen or by the intense heat of the gases making up the smoke. Intoxication, disorientation, incapacity, unconsciousness and possibly death may result.

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

To facilitate escape it is necessary:

- a) to ensure that protected escape routes are safeguarded against the ingress of smoke;
- b) to regulate the distance people have to travel before they reach a storey exit or final exit.

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

After the outbreak of fire, there may be only a short time during which the actions necessary for ensuring the safety of occupants can be carried out. This time will be sufficient only if all contributing factors, e.g. the design of the building, the materials at risk, the co-operation of the staff, and the functioning of equipment, are planned and managed so as to be effective when the occasion arises.

### 5.3 Site planning

Siting of a building may be dictated by restrictions imposed by urban development. These restrictions may produce conditions potentially dangerous from the point of view of fire spread from a building on fire to another exposed to its effects.

At the planning stage, the building control authority should be consulted regarding such matters as access to buildings by fire appliances and the effects of car parking adjoining the building.

A further site planning consideration is the safety of escape routes outside the building, and outside neighbouring buildings, from the effects of fire in the building concerned.

Consultation with the water supply company is necessary regarding the adequacy of water supplies for firefighting.

### 5.4 Mixed user developments

The principles and recommendations of this code will apply straightforwardly where premises have a single main use and are contained in a single, separate building. However, complications may arise where a building comprises two or more different main uses. In such cases it is important to consider the effect of one risk on another. A fire in a shop, or unattended office, could have serious consequences on, for example, a residential or hotel use in the same building. Similarly a high fire risk in one part of a building could seriously affect other areas in another part of that building.

It is therefore important to consider whether completely separate routes of escape should be provided from each different use within the building or whether other effective means to protect common escape routes can be provided.

In reaching a conclusion, the following factors need to be considered in addition to items a) and b) of 5.2:

- a) the hazard posed by one occupancy to another;
- b) provision for giving warning in case of fire, including any automatic fire detection;
- c) the provision of sprinkler protection and smoke control arrangements;
- d) the management and control of the building or development, from a fire safety point of view.

The recommendations of the relevant Part of BS 5588, or the provisions of legislation, appropriate to each use are applicable to the whole of any escape route which passes through a different use, right up to the final exit. Where different levels of protection could apply, the higher level of protection should be provided.

NOTE Attention is drawn to the fact that different uses might be covered by different legislation.

### 5.5 Premises in different occupation

See BS 5588-12.

## 5.6 Internal subdivision

### 5.6.1 General

The manner in which a building is subdivided internally will affect the risk to users and their ability to use the means of escape arrangements in case of fire. The various forms of subdivision and their effects on users are considered in 5.6.2, 5.6.3, 5.6.4 and 5.6.5. For atrium buildings see BS 5588-7.

### 5.6.2 Compartments

The internal subdivision of a building into fire compartments influences the escape arrangements, particularly as regards evacuation procedures and the number of stairs and exits. This is because only the occupants and contents within a fire compartment have to be regarded as being initially at risk from a fire occurring anywhere within that compartment.

**NOTE** This assumption cannot be made where openings in compartment floors and in compartment walls are protected by steel fire shutters held open by fusible links. Evacuation procedures may be based on individual compartments if openings are fitted with self-closing fire resisting doors.

In an uncompartmented building all the occupants and contents of the building have to be considered at risk in the event of fire.

### 5.6.3 Cellular planning

Cellular planning is the subdivision of all or part of office floor areas into separate rooms with access corridors.

### 5.6.4 Open storey (horizontal) planning

In open storey planning almost the whole floor area of a storey is undivided by partitions, although there may be some screens or high furniture for display purposes in, for example, office storeys and in shop sales areas, or to give privacy to some areas. In this case many of the occupants of one storey may be aware of smoke from a fire at the outset and this will give the advantage of early warning. Nevertheless, the rapid spread of fire and smoke by some modern materials in the early stages of a fire can produce very hazardous conditions.

### 5.6.5 Open spatial (vertical) planning

In open spatial planning several storeys are contained in one uncompartmented volume such that smoke and heat will travel readily throughout all levels. This form arises (for example) by the adoption of one or more of the following planning arrangements:

- a) split level floors;
- b) floors arranged as a spiral throughout the height of the building;
- c) balconies or gallery floors overlooking a central well or courtyard.

## 5.7 Ancillary accommodation and high fire risk areas

Section 3 and Section 4 contain principles and recommendations for the planning and construction of those parts of the building devoted to the main use of the building and that are likely to be occupied by the staff and any members of the public. Other parts, ancillary to the main use of the building, are referred to in this code as ancillary accommodation, and are covered in Section 5.

Where highly flammable or explosive substances are stored or used in excess of prescribed amounts, the area is considered to be of high fire risk. Special requirements for such areas may be imposed under the Health and Safety at Work etc. Act 1974 [5] by the relevant enforcing authority, and by the fire authority under the Fire Precautions Act 1971 [6]. Early consultation with the relevant authorities is therefore recommended when the storage and use of such substances is proposed; as is the provision of a brief as to the intended use of the premises and the materials to be stored or used, since this may overcome the need for costly and additional fire safety measures being required after the premises are occupied.

## 6 Escape from fire

### 6.1 General

In an emergency there have to be sufficient exit facilities to allow all the occupants to reach an area of relative safety without delay. The place of safety is beyond the final exit but it may not always be practicable to evacuate the whole of the building immediately upon the incidence of fire in any part. Nevertheless, it is essential that the occupants are able to reach, without undue delay, areas of relative safety, e.g. protected routes and stairways within the building that lead ultimately to the open air.

The assumption need not be made that the whole building necessarily has to be evacuated in a fire emergency. If measures are taken in large premises, it may be practical and suitable to evacuate in stages. Where compartments are separated in such a manner as to prevent the spread of smoke in the early stages of a fire, or there is a system controlling the movement of smoke, the occupants may remain in a fire compartment not affected by the fire, provided that they are still free to leave the building by protected escape routes. Evacuation procedure is dealt with in BS 5588-12.

NOTE Capacities of exits have been based on the assumption that a unit width of 500 mm permits a flow of 40 persons per minute. The time taken to travel to a protected escape route is controlled implicitly through the recommendations limiting exit capacity and travel distance (see Clause 8). These figures are based on the Post-War Building Studies No 29 [7].

### 6.2 Motivation to escape

Motivation to escape is important. Research into several major fatal fires and evacuations suggests that in large internal spaces people in a crowd have difficulty in recognizing any immediate threat from a fire elsewhere in the building. People are also likely to underestimate how quickly a fire can spread. In a fire disaster, the uncertainty of the situation in its early stages is usually compounded by a serious delay in warning the occupants in time for them to start to evacuate and reach safety. To overcome these problems it is necessary to provide a package of related fire precautions measures, complementary staff training and evacuation management procedures, and to introduce appropriate means of escape criteria, aimed at achieving an acceptable level of means of escape conditions in these areas. These aspects are dealt with in Section 3, Section 4, Section 5, Section 7 and BS 5588-12.

### 6.3 People with disabilities

Building regulations include requirements for access (and facilities) for disabled persons. BS 5810 gives guidance on access for people with disabilities, whilst BS 5588-8 gives guidance on the provision of means of escape for persons with disabilities, with particular emphasis on the need for effective management of the evacuation.

### 6.4 Avoidance of manipulative apparatus for means of escape

Reliance for fire safety on manipulative apparatus for means of escape, or on external rescue from the lower storeys of a building by the fire service using mobile ladders, is not normally satisfactory. This code provides for the occupants on any storey of a building being able to escape safely from the building without outside assistance, should a fire occur.

### 6.5 Distances of travel

Some of the recommendations in this code include limitations on the distance of travel between two points. Although it could not be said that a slightly greater distance would be so unsafe that it should under no circumstances be adopted, designers should aim to keep travel distances as short as possible, rather than designing to the maximum distance recommended.

## Section 3. Planning of escape

### 7 General

Planning of means of escape involves consideration of a number of interrelated elements. These elements will include the limitation of travel distance which will determine the position of exits, whilst the number of persons to be evacuated will determine the size and number of exits and escape routes required.

For example, although maximum distances of travel (see 8.1) may have a major influence on the number of escape routes and stairs required and their disposition, the geometry of the building (see 9.3) and the number of persons to be evacuated (see 8.5 and 9.4) will also have a bearing on the size and disposition of the stairs. Although these factors may in some circumstances suggest that a single stair may suffice, the height and size of the building may nevertheless necessitate the provision of more than one stair (see 9.3) or stairs for firefighting purposes (see 40.4).

Clause 8 deals with horizontal escape along a suitable escape route to a storey exit. The recommendations are mainly concerned with providing more than one escape route (except in severely restricted circumstances), limiting the distance to be travelled, and ensuring that the routes are wide enough.

Clause 9 deals with vertical travel down or up a stair towards a final exit. The recommendations are mainly concerned with the provision of a sufficient number of protected stairways of appropriate width.

Clause 10 deals with small premises having floor areas so small as to render onerous the application of all of the recommendations for larger premises.

Clause 11 deals with means of escape from “special premises” as defined in the Fire Certificates (Special Premises) Regulations 1976 [1], where the recommendations of Clause 8 and Clause 9 are not appropriate.

Clause 12 deals with the problems of wayfinding and spatial orientation. In that context it is desirable to avoid confusing spatial layouts in the initial design, as these can lead to wayfinding difficulties.

When designing the means of escape from any building in the event of fire, a full appreciation of the probable behaviour of fire is necessary. The overall design for a building needs, therefore, to be carefully assessed section by section to determine the danger that might arise either from a fire in that location or from a fire elsewhere in the building.

The primary danger associated with fire in its early stages is not flame, but the smoke and noxious gases produced by the fire. Measures designed to provide safe means of escape should include provisions to limit the spread of smoke and gases.

The basic criteria which have been adopted in determining the design for the means of escape are as follows.

- a) Generally there should be alternative means of escape.
- b) Every part of the building should be within a reasonable distance from either:
  - 1) an exit to a place of safety at ground or access level; or
  - 2) an exit to a protected stairway which leads to a place of safety

The following facilities are not acceptable for use as means of escape in case of fire:

- i) lifts (except suitably designed and installed firefighting lifts or evacuation lifts for the use of disabled persons, see 26.5);
- ii) passenger conveyors and escalators (but see 26.5.2);
- iii) portable ladders, throw-out ladders and self-rescue apparatus.

Means of escape from ancillary accommodation is dealt with in Clause 15.

## 8 Escape routes within, and exits from, a storey

NOTE 1 Crèches are covered in 8.11.

NOTE 2 The provision of escape routes in weather housed plant, weather protected plant and external plant is covered in 11.3.

### 8.1 Distances of travel

#### 8.1.1 Commentary

*For the purpose of determining the means of escape in a building, travel distances (see 3.40) are used. However, for the purposes of design direct distances (see 3.11) are normally adopted (see Figure 2, Figure 3, Figure 4 and Figure 5). In this case, before any floor space is subdivided, furnished or fitted out, or positions of plant or equipment finalized, the resultant travel distances need to be checked so that in use they will not exceed the recommended maximum travel distances. If, at the design stage it is possible to establish what the travel distance will be in a particular case, the direct distance measurements are not relevant.*

*Where the occupants have no choice but to make their way along a single escape route, the travel distance needs to be more restricted than if escape is possible in more than one direction.*

*In some buildings travel distances are given according to whether the premises (or part of the premises) is considered to be of low, normal or high hazard. Examples of the different types of hazard are as follows.*

- a) Normal hazard. Where any outbreak of fire is likely to remain localized or is likely to spread only slowly, and where there is little hazard of any part of the building structure igniting readily.*
- b) Low hazard. Where there are very few flammable and no explosive materials present and where the hazard of fire breaking out and smoke or fumes spreading rapidly is minimal.*
- c) High hazard. Where there are:*
  - 1) materials stored or handled in such quantities or dispositions that they would be likely, if ignited, to cause the rapid spread of fire, smoke or fumes. For example, processes handling large quantities of highly flammable liquids, gases and solids, such as polyurethane foam;*
  - 2) unusual circumstances relating to the occupants; or*
  - 3) certain areas which, due to their function, may present a greater risk of fires occurring and developing than elsewhere.*

*Further information on assessment of risk is given in Fire Precautions Act 1971. Guide to fire precautions in existing places of work that require a fire certificate. Factories, offices, shops and railway premises [8]. The choice of hazard category will have to satisfy the appropriate authority. This is particularly important if a fire certificate is required. Information on the classification of fire hazard, with particular reference to Special Premises (see 3.38) is also given in the Health and Safety Executive booklets Guide to general fire precautions at premises subject to the Fire Certificates (Special Premises) Regulations 1976 [9] and Assessment of fire hazards from solid materials and the precautions required for their safe storage and use guide HS(G)64 [10].*

*If it is desired to use travel distances greater than those given in Table 1, it is necessary to show that the occupants will still be able to escape long before they are likely to be exposed to smoke or other fire danger (see DD 240 which deals with the use of fire safety engineering in buildings).*

### 8.1.2 Recommendations

The following recommendations are applicable.

- a) The escape routes from any storey should be of such a number and so situated that the travel distance from any point to the nearest storey exit does not exceed the appropriate limits set out in Table 1.

NOTE The distance to an alternative exit may exceed that given in Table 1.

- b) If travel is initially in one direction only, then:

- 1) the total travel distance to the nearest storey exit (including that part in one direction only) should not exceed the appropriate limit given in column (2) of Table 1; and

- 2) either:

- i) the travel distance to the point at which travel is possible in more than one direction should not exceed the appropriate limit given in column (1) of Table 1; or

- ii) in a dead end in part of a storey served by two or more storey exits the angle subtended by the storey exits at the point at which the escape routes diverge should be not less than  $45^\circ$  plus  $2.5^\circ$  for every metre travelled in one direction up to the point at which the escape routes diverge (see Figure 4).

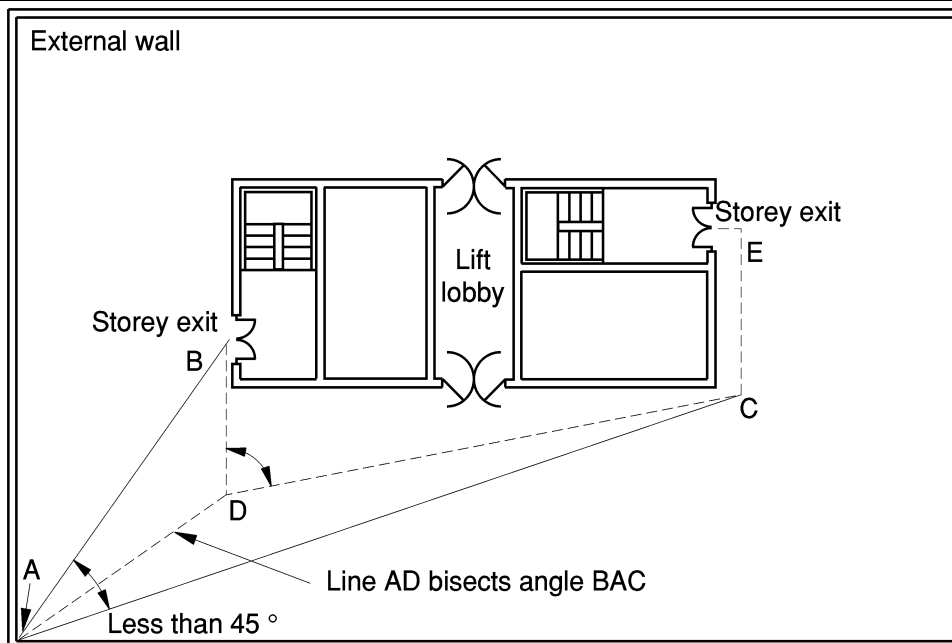
- c) For travel to be considered to be in more than one direction, either:

- 1) the routes should be not less than  $45^\circ$  apart; or

- 2) the routes should be separated from each other by fire resisting construction (see Figure 5).

**Table 1 — Maximum distances of travel in a storey**

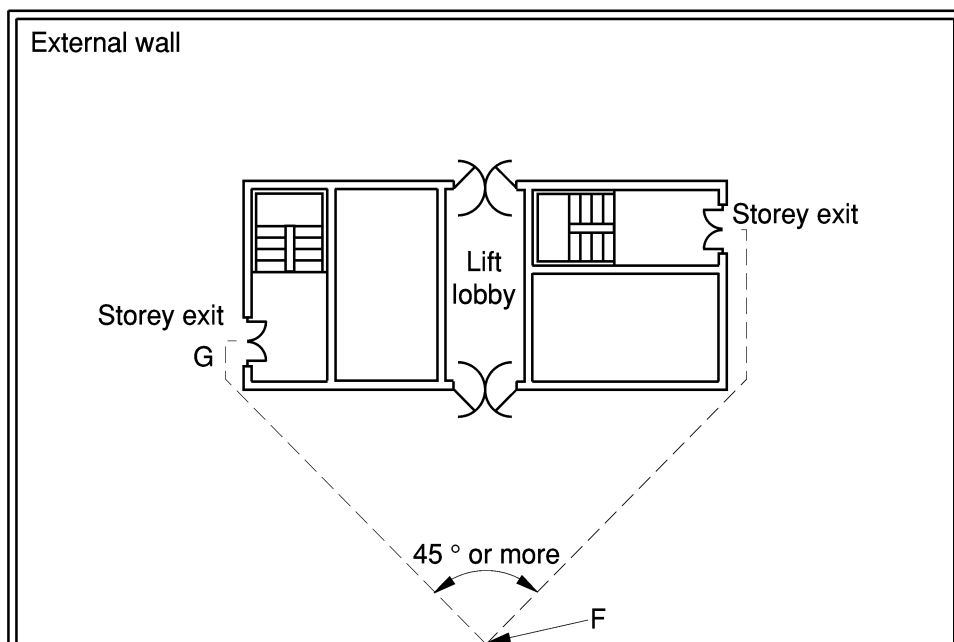
| Accommodation                                                                                                                                                                         | Maximum travel distance<br>m           |                                                | Maximum direct distance<br>m           |                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------|----------------------------------------|------------------------------------------------|
|                                                                                                                                                                                       | Escape in one<br>direction only<br>(1) | Escape in<br>more than one<br>direction<br>(2) | Escape in one<br>direction only<br>(3) | Escape in<br>more than one<br>direction<br>(4) |
| 1. <i>Industrial, storage buildings and laboratories</i>                                                                                                                              |                                        |                                                |                                        |                                                |
| a) low hazard <sup>a</sup>                                                                                                                                                            | 45                                     | 60                                             | 30                                     | 40                                             |
| b) normal hazard <sup>a</sup>                                                                                                                                                         | 25                                     | 45                                             | 16                                     | 30                                             |
| c) high hazard <sup>a</sup>                                                                                                                                                           | 12                                     | 25                                             | 8                                      | 16                                             |
| 2. <i>All other buildings</i>                                                                                                                                                         | 18                                     | 45                                             | 12                                     | 30                                             |
| NOTE 1 See Table 6 for maximum distances of travel in small premises, Table 7 for weather housed and protected plant and external plant, and Table 10 for ancillary accommodation.    |                                        |                                                |                                        |                                                |
| NOTE 2 Direct distances are for design purposes only. The limitations on travel distance need to be met when the floor space is subdivided or furnished.                              |                                        |                                                |                                        |                                                |
| NOTE 3 The grading of direct distances of travel in relation to categories of hazard could lead to future problems if an optimistic approach is adopted on a speculative development. |                                        |                                                |                                        |                                                |
| NOTE 4 With the discretion of the enforcing authority, variation of the travel distance may be permitted if additional fire protection facilities are provided (see Section 7).       |                                        |                                                |                                        |                                                |
| NOTE 5 For atrium buildings see BS 5588-7.                                                                                                                                            |                                        |                                                |                                        |                                                |
| <sup>a</sup> Examples of different types of hazards are given in 8.1.1.                                                                                                               |                                        |                                                |                                        |                                                |



----- Indicates direct distance

a) Dead end

NOTE A is a dead end because angle CAB is less than 45° and there is no fire resisting construction between BA and CA. If angle CDB is greater than 45° (+ 2.5° or every metre travelled from A to D) then the dead end may be assumed to be served by two storey exits. The shorter of ADB and ADCE should not exceed the figure in column 4 of Table 1.

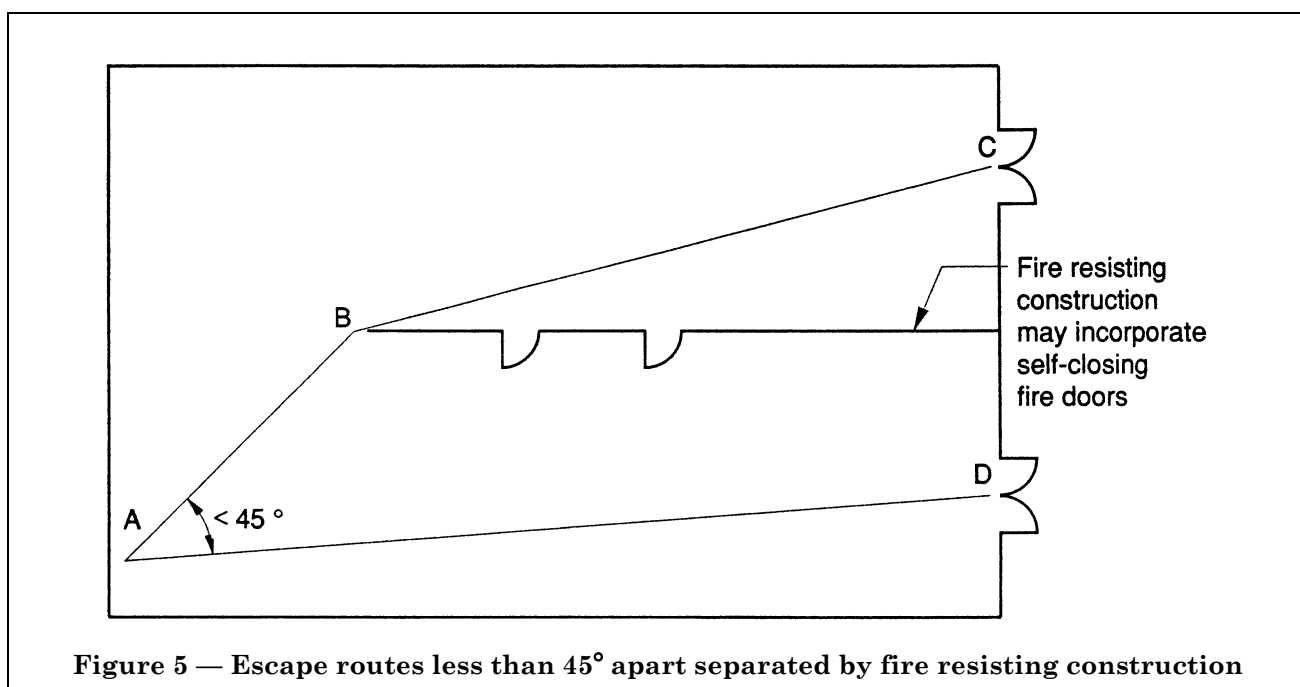
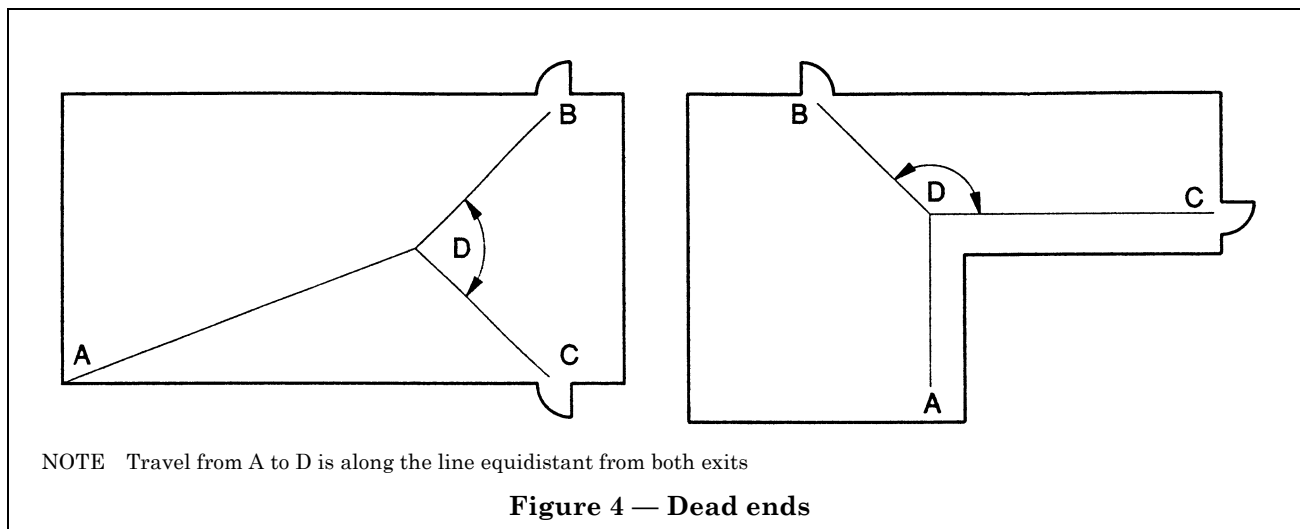


----- Indicates direct distance

b) Escape in two directions

NOTE Direct distance FG is in accordance with Table 1 column 4.

**Figure 3 — Direct distance: central core with open storey planning**



## 8.2 Number of escape routes from a storey

### 8.2.1 Commentary

*Escape routes from each storey (or level) ought to be so sited that a person confronted by fire can turn away and make a safe escape through an alternative exit. To achieve this, two exits therefore need to be accessible in substantially different directions in order to avoid both becoming inaccessible at the same time from one fire. If the two directions diverge by less than 45° and are not separated by fire resisting construction they are considered to provide escape in one direction only (see Figure 3, Figure 4, Figure 5 and Figure 6). A situation in which this occurs is a dead end (see 3.9).*

*In certain circumstances, one of the two escape routes from a storey may be by way of an opening into an adjoining compartment. This compartment may be provided to meet the requirements of building regulations or it may be provided solely for means of escape purposes. The circumstances under which this may be considered to be a safe arrangement are that:*

- a) the building is in one occupancy;*
- b) the compartment to which persons can make their escape is separated from the fire affected area in such a way that persons escaping to it are no longer in immediate danger from fire;*
- c) the compartment is capable of accommodating the number of persons likely to evacuate to it; and*
- d) the compartment is provided with at least one storey exit of sufficient capacity to cater for the number of persons escaping to it.*

*If a fire occurs in a small storey it will have developed to such a small extent by the time the occupants become aware of it that they will normally be safe even if there is a single exit door as long as the storey contains no special fire risk, the number of people is not excessive and the storey so small (and therefore the travel distance so short) that the evolution of heat and smoke from the fire will not prevent them reaching the exit. Therefore a single exit is acceptable where the travel distance from all parts of the storey does not exceed the limits for dead ends (e.g. small shops, see Clause 10). Escape in one direction is also acceptable from parts of a storey (see Figure 3 and Figure 4).*

*Although generally undesirable, there are instances when ancillary accommodation may need to be used as part of an escape route for the public. Recommendations for escape from ancillary accommodation are given in Clause 15.*

*Mezzanines are covered in 8.4.*

### 8.2.2 Recommendations

The following recommendations are applicable.

- a) At least two escape routes should be provided from every storey or floor level (except any storey within the limits for escape in one direction only given in Table 1). These escape routes should provide travel in different directions and should give direct access to a storey exit.
- b) One of these escape routes may be to an adjoining compartment provided that:
  - 1) the building is in one occupancy;
  - 2) the adjoining compartment is separated from the fire affected area by walls of fire resisting construction with the openings therein fitted with self closing doors;
  - 3) the adjoining compartment is of sufficient size to accommodate both its own occupants and those exiting to it from the fire affected area; and
  - 4) the adjoining compartment has storey exits of sufficient capacity to cater for 50 % of the total occupancy of the compartment taking into account both the number of occupants in the adjoining compartment and the number of persons escaping to it.
- c) Where unavoidable, an escape route for the public may be via an area of ancillary accommodation, other than an area of high fire hazard, provided that it is not the only available escape route from the area concerned. The route through the area of ancillary accommodation to a storey exit should be clearly defined by means of guard-rails.
- d) Where a storey in a shop includes a restaurant area, or is divided into separate floor areas, each area [except inner rooms in accordance with 8.3.2b)] should be provided with not less than two escape routes, one of which should lead directly to a storey exit without entering any area of high risk.

### 8.3 Number of escape routes from a room

#### 8.3.1 Commentary

*The basic concept of providing alternative means of escape (outlined in 8.2.1) also applies to rooms. However, the number of exits from rooms needs to be considered separately as, although a storey may require two or more exits, it may be reasonable for each of the individual rooms within that storey to be served by a single exit.*

*If the only escape route from a room (i.e. an “inner room”, see 3.24) is by way of another room (i.e. an “access room”, see 3.1), an outbreak of fire in the access room may not immediately come to the notice of the occupants of the inner room and their escape may therefore be jeopardized. Because of this risk, various safeguards are necessary where there is an inner room, and these safeguards include the provision of early warning in the event of an outbreak of fire in the access room.*

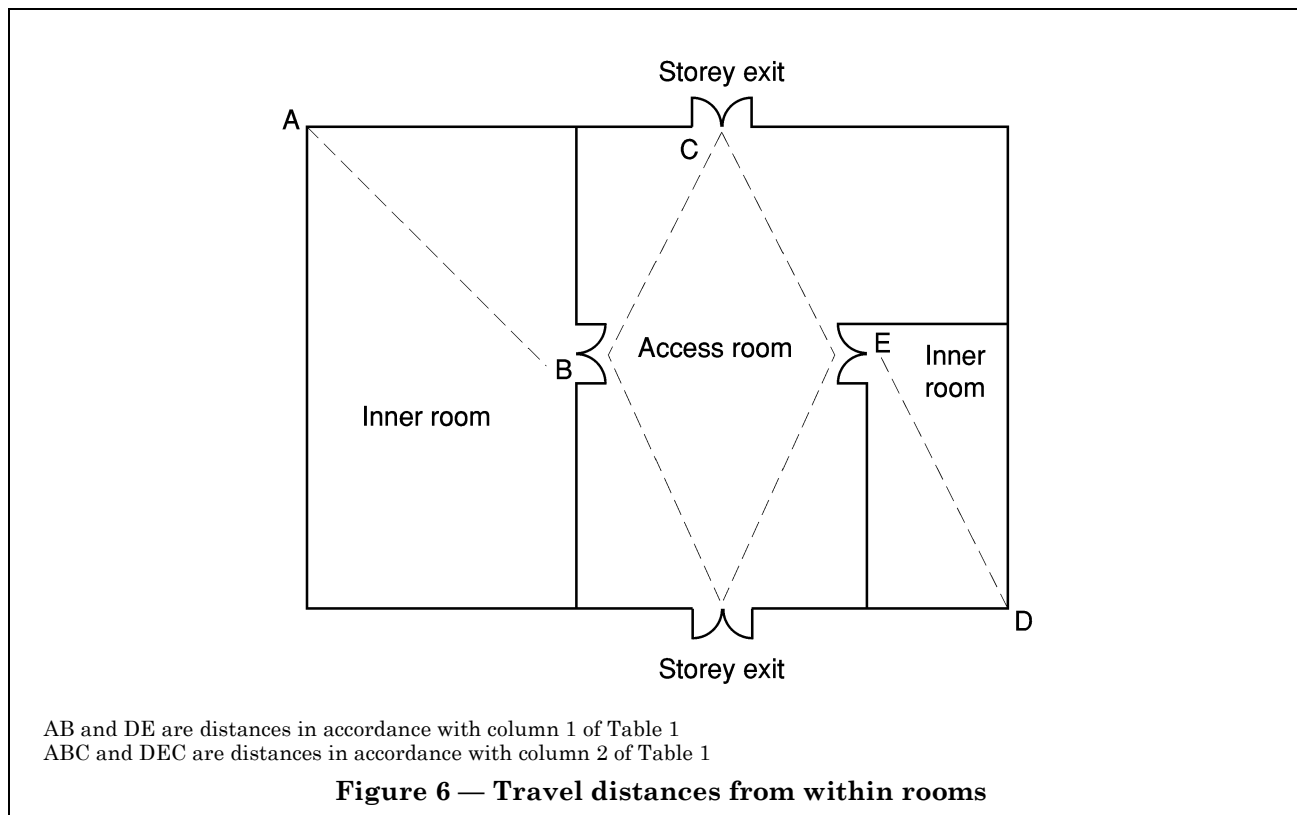
*In parts of premises considered to be high fire hazard, it is necessary to impose limitations on the number of persons permitted.*

#### 8.3.2 Recommendations

Not fewer than two exits should be provided from every room, except in the case of:

- a) a room which is not likely to be used by more than 50 persons and the portion of the travel distance within the room does not exceed the appropriate limit given in column (1) of Table 1 (see Figure 6); or
- b) an inner room which is not likely to be used by more than 50 persons and the portion of the travel distance within the room does not exceed the appropriate limit given in column (1) of Table 1 (see Figure 6); and where
  - 1) the escape routes are arranged to pass through not more than one access room, and the travel distance, including the portion through the access room, does not exceed the appropriate limit given in Table 1; and
  - 2) the access room is not an area of high hazard (see 8.1.1) and is in the control of the same occupier; and
  - 3) except in the case of a fitting room in a shop and a photograph processing room, at least one of the following provisions is made:
    - i) the enclosure between the inner room and access room is constructed to maintain a gap of at least 500 mm between the top of the wall and the ceiling; or
    - ii) a suitably sized and located vision panel is provided between the two rooms; or
    - iii) the access room is protected by an automatic smoke detector that operates an alarm which is audible in the inner room, to a sound pressure level in accordance with the minimum specified in BS 5839-1:1988. Alternatively, where noise levels are so great as to make an alarm inaudible, a visual indication in the inner room would be acceptable.

NOTE The vision panel in item ii) should have an area not less than 0.1 m<sup>2</sup>, and the bottom of the panel should be located not less than 900 mm or more than 1 500 mm above the floor level.



## 8.4 Escape from mezzanines and galleries

### 8.4.1 Commentary

Many buildings utilize mezzanines as a way of creating additional space for various purposes. When large quantities of readily combustible products are stored or displayed under a large plan mezzanine with a solid floor (as in some DIY outlets) there is always the risk that fire growth may be very rapid, resulting in flames spreading beyond the edge of the mezzanine floor and hence posing a grave threat to life safety, particularly when the occupants of the building are members of the public. Although as a general principle the considerations outlined in 8.1, 8.2 and 8.3 apply to the planning of means of escape from mezzanines, additional safeguards may be necessary to compensate for the increased level of hazard if a fire occurs below the mezzanine.

### 8.4.2 Recommendations

The following recommendations apply.

- At least two escape routes should be provided from a mezzanine which is regularly occupied or accessible to members of the public, one of which should be via a protected stairway. The travel distance from any point on the mezzanine to the nearest storey exit should be in accordance with Table 1. [See Figure 7a).]
- If combustible goods are stored or displayed under a mezzanine with a solid floor, the travel distance from any point on the mezzanine to the nearest storey exit, should be limited to that given in Table 1 for escape in one direction only unless a smoke detection system is installed on the underside of the floor which is linked to a fire alarm system or gives an audible warning of fire to the occupants of the mezzanine.
- The travel distance from any point on a mezzanine which is only used for storage or access (for servicing or maintenance purposes) to the nearest storey exit on the storey below the mezzanine should be in accordance with Table 1. [See Figure 7b).]

## 8.5 Width of exits and escape routes

### 8.5.1 Commentary

*Every exit needs to be wide enough to enable the quick passage of all the occupants who may need to use it. For corridors, etc., the width needs to be not less than the required door width to the stairway or the width of the final exit as appropriate.*

*Except where a single exit is acceptable, it needs to be assumed that one of the exits may become obstructed by the fire. Therefore, where two exits are provided, each needs to be capable of letting all the occupants pass. Where three or more exits are provided, each exit in turn needs to be discounted in assessing the widths of the others.*

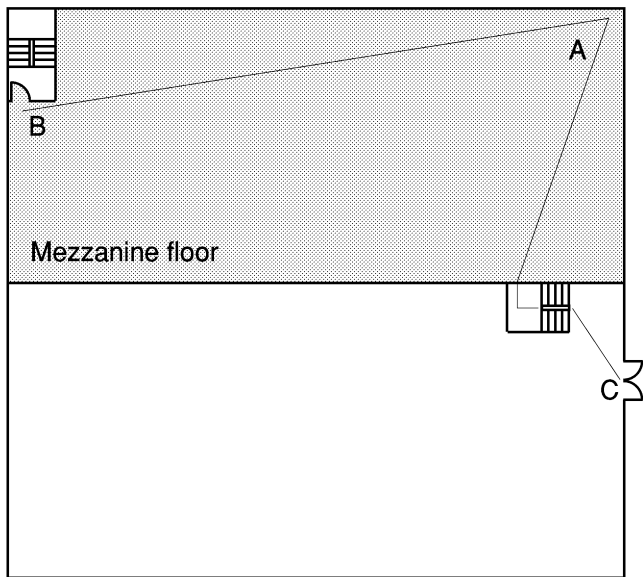
*The number of occupants for whom provision has to be made may be known for certain areas, otherwise the numbers may be calculated from the floor space per person given in Table 2. In that case the number of occupants of a room or storey can be estimated from the following expression:*

$$\text{number of occupants} = \frac{\text{area of room or storey (in square metres)}}{\text{floor space per person (in square metres)}}$$

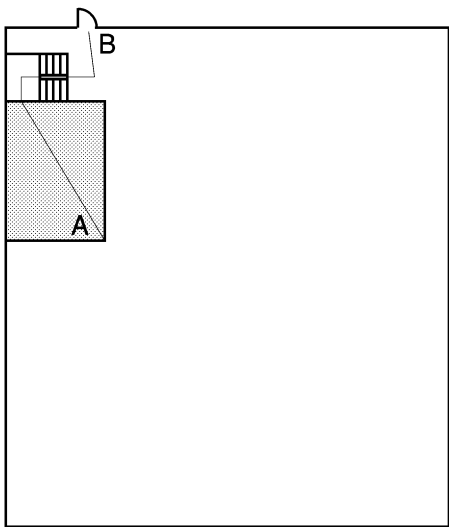
*NOTE The list given in Table 2 is not exhaustive, and when the number of occupants is not known, and the use is not given in Table 2, the occupancy factor for a use with a similar density should be used.*

*Whatever method is used for assessing the number of persons using a room or storey, the appropriate authority will need to be satisfied that appropriate exits and widths of exits are provided for the number of persons actually using the premises when occupied. This is particularly important if a fire certificate is required.*

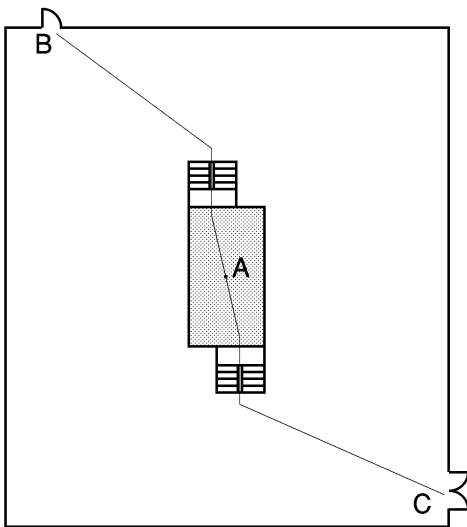
*The number of occupants of a building is the sum of the numbers of occupants of the storeys in the building.*



Travel distances AB, AC within overall limits given in Table 1 for escape in more than one direction  
a) Occupied mezzanine



Travel distance AB within limits given in Table 1 for escape in one direction  
b) Mezzanines used for storage or access



Travel distances AB, AC within overall limits given in Table 1 or escape in more than one direction

**Figure 7 — Escape from mezzanines**

Table 2 — Suggested floor space factors<sup>a</sup>

| Description of room or storey                                                                                                                                                                                                                                                                                                                                                                                                        | Floor space per person, excluding stair enclosures, lifts and sanitary accommodation<br>m <sup>2</sup> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Retail premises where the occupancy is known and the floor space factor can be ascertained by reference to similar premises                                                                                                                                                                                                                                                                                                          | 2.0 to 10.0 <sup>b</sup>                                                                               |
| Retail premises where the occupancy is not known or the floor space factor cannot be ascertained by reference to similar premises                                                                                                                                                                                                                                                                                                    | 4.0                                                                                                    |
| Public restaurants and lounges                                                                                                                                                                                                                                                                                                                                                                                                       | 1.0 <sup>c</sup>                                                                                       |
| Bars                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.3 <sup>c</sup>                                                                                       |
| Staff coffee lounge, committee room, conference room, dining room, meeting room, restaurant, common room, lounge, reading room, staffroom, waiting room                                                                                                                                                                                                                                                                              | 1.0 <sup>c</sup>                                                                                       |
| Open plan offices, factory production areas, workshops                                                                                                                                                                                                                                                                                                                                                                               | 5.0                                                                                                    |
| Library and other offices, kitchens                                                                                                                                                                                                                                                                                                                                                                                                  | 7.0                                                                                                    |
| Warehouse and storage accommodation                                                                                                                                                                                                                                                                                                                                                                                                  | 30.0                                                                                                   |
| Car park                                                                                                                                                                                                                                                                                                                                                                                                                             | 2 persons per parking space                                                                            |
| <sup>a</sup> These floor space factors are for guidance only and should not be taken as the only acceptable densities.<br><sup>b</sup> The floor space factor for each room or storey should be determined by reference to actual data taken from similar premises. The data should reflect the average occupant density at a peak trading time of year.<br><sup>c</sup> For seated areas, the number of seats provided may be used. |                                                                                                        |

### 8.5.2 Recommendations

The following recommendations are applicable.

- a) The capacities of exits or escape routes within a storey should be calculated in accordance with Table 3. The capacity or aggregate capacity of exits and escape routes should be not less than the number of occupants of the storey. If two or more exits or escape routes are required, the capacity or aggregate capacity should be not less than the number of occupants of the storey when the capacity of each exit or escape route is discounted in turn.

NOTE The total number of persons which two or more available exits can accommodate is found by adding the maximum number of persons for each exit width. For example 3 exits each 900 mm wide will accommodate  $3 \times 110 = 330$  persons (not the 540 persons accommodated by a single exit 2 700 mm wide).

- b) If a storey exit (or final exit) in a shop is approached through a check-out point (e.g. in a supermarket) each check-out passage should be not less than 500 mm in clear width and the combined width of the check-out passageways should be not less than twice the required width of the storey exit, unless further exits with a width not less than that of the storey exit, and independent of the check-out points, are provided.

- c) No escape route should have a clear headroom of less than 2 m (except doorways and other exits which should have a clear headroom of not less than 1.96 m) and there should be no projection from any wall (except normal handrails) or from the ceilings (including suspended ceilings) below this height which would impede the free flow of persons using the escape route.

**Table 3 — Capacities of escape routes within a storey and of any exit leading therefrom**

| Maximum number of persons                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Width<br>mm        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 800 <sup>a</sup>   |
| 110                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 900                |
| 220                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 100              |
| 240                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 200              |
| 260                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 300              |
| 280                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 400              |
| 300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 500              |
| 320                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 600              |
| 340                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 700              |
| 360                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 800 <sup>b</sup> |
| <sup>a</sup> A width of 600 mm is permissible for any escape route that is not a protected corridor or part of an external escape route, in:<br>a) process plant buildings and other locations where the primary purpose of the passageways and walkways is to provide access to and from plant and equipment; and<br>b) any other location which is not an area of high fire hazard;<br>providing it is demonstrable that the persons in these locations need to be fully ambulant to carry out the tasks expected of them, that the maximum number of people expected to use the route does not exceed 10 and they are not members of the public.<br><sup>b</sup> Other values of width for a maximum number of persons greater than 360 may be obtained by extrapolation. |                    |

## 8.6 Corridors

### 8.6.1 Commentary

*Where a corridor provides escape in one direction only, i.e. from a dead end, it is necessary for its construction to enable occupants to pass safely a fire in any adjacent room and reach an exit or protected stairway.*

*To prevent a corridor that connects alternative exits becoming smoke logged along its length, it is necessary to divide that corridor. Similarly, communicating corridors need to be separated so as to restrict the movement of smoke.*

*The separating doorset needs to be suitably positioned between the two exits it is to separate. If there are doors serving the same room on both sides of the separating doorset [see Figure 9a)] and the corridor is not a protected corridor (see 3.34), then the doors to the room need to be self-closing.*

**NOTE** *The location of the separating doorset in such corridors is not an arbitrary restriction on the length of undivided corridors, but reflects the need to maintain the integrity of the means of escape.*

### 8.6.2 Recommendations

The following recommendations are applicable.

- a) Corridor partitions should be carried up to the underside of the structural floor above, or to an imperforate suspended ceiling. All openings, other than to an enquiry or reception area, should be fitted with doors.
- b) Dead end corridors and service corridors should be protected corridors.
- c) Communicating corridors and dead end corridors should be separated as indicated in Figure 8, Figure 9a) and Figure 9b) and in Figure 9c), respectively. Corridors connecting alternative exits more than 12 m apart (measured along the centre line of the corridor) should be subdivided as indicated in Figure 9. Any doors to the accommodation that would allow smoke to bypass the separating door should be self closing.

NOTE 1 Dead end portions of corridors need not be separated from the remainder of the corridor by a fire door as shown in Figure 9c) if the protected stairways and corridors are protected with a smoke control system using pressure differentials that is in accordance with BS 5588-4.

NOTE 2 Recesses off corridors as shown in Figure 10 and extensions of corridors beyond protected stairways as shown in Figure 11 need not meet the recommendations of items b) and c) in respect of dead end situations unless:

- a) the corridor otherwise should be a protected corridor; or
- b) the accommodation served otherwise should be separated from other parts of the building by fire resisting construction.

## 8.7 Multi-occupied premises

### 8.7.1 Commentary

*If a building is in multiple occupancy, people in one part of the premises may not be aware of an outbreak of fire in a different part of the premises, particularly if it is empty. It may be necessary in certain circumstances to provide fire resisting separation between different occupancies, to ensure that escape routes are planned to be independent of each other and to provide a suitable common alarm system, installed to provide warning throughout the premises of any outbreak of fire in any part of the premises.*

### 8.7.2 Recommendations

The following recommendations are all applicable to all premises other than offices. For offices, recommendation a) and either recommendation b) or recommendation c) are applicable.

- a) The means of escape from each occupancy should be independent of, and should not pass through, any other occupancy.

NOTE Any future subdivision of the storey may cause additional means of escape to be required.

- b) Any common corridor between different occupancies should comprise a protected corridor.
- c) A common automatic fire detection and alarm system that conforms as a minimum to Type L3 of BS 5839-1:1988 should be installed throughout the building.

## 8.8 Escape routes using service corridors, unloading areas and service roads

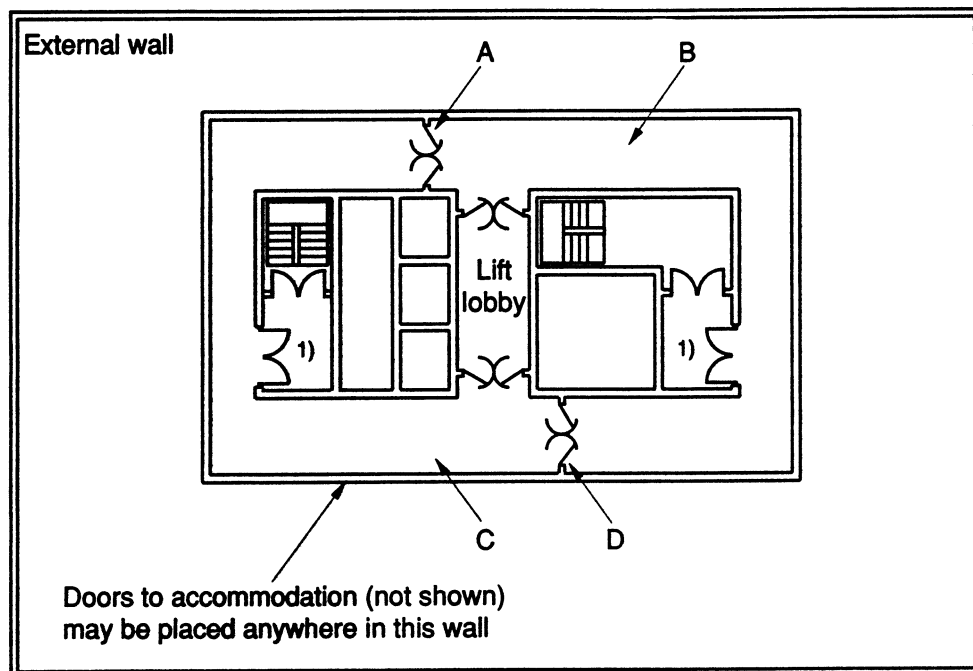
### 8.8.1 Commentary

*Any necessary alternative means of escape should be planned so as to be independent of service corridors, unloading areas and internal service roads. However, in unusual cases it may be necessary owing to site restrictions to use such ancillary accommodation to provide alternative means of escape.*

*Service corridors may be used if restrictions are imposed regarding their use and measures incorporated to ensure their suitability and availability. For instance it may be necessary to allow an extra 1 m of width in an escape route for any goods that may be in transit.*

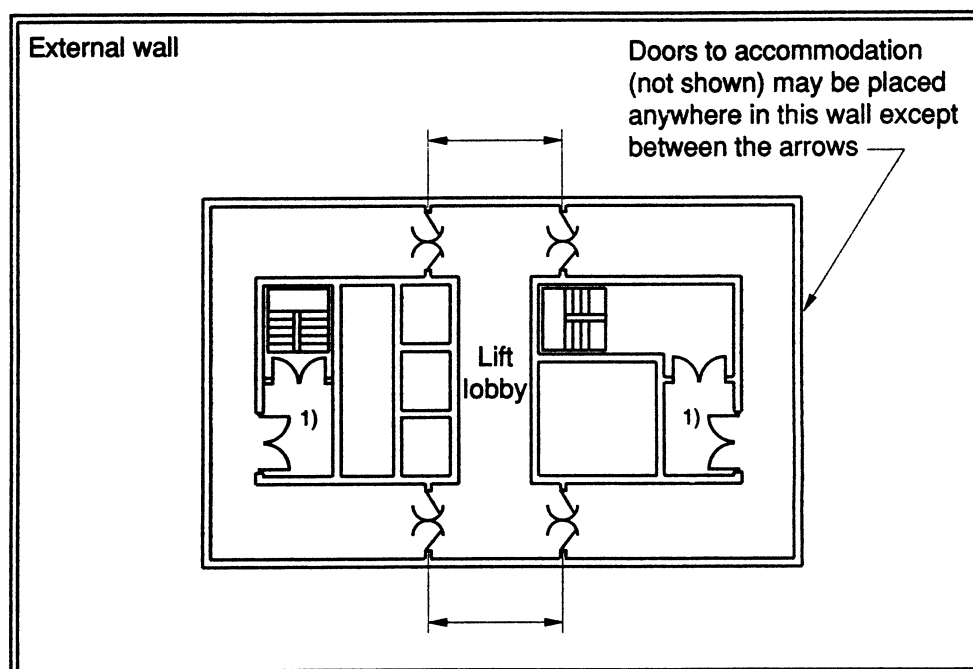
*Similarly unloading areas and service roads may be used in exceptional circumstances provided that the escape routes remain unobstructed and available for use.*

*A service corridor, which is a corridor common to a number of fire separated occupancies, may be used as a common escape route.*



Two doors may be at A and D, or at B and C, but not at A and C, or at B and D

a) Example 1

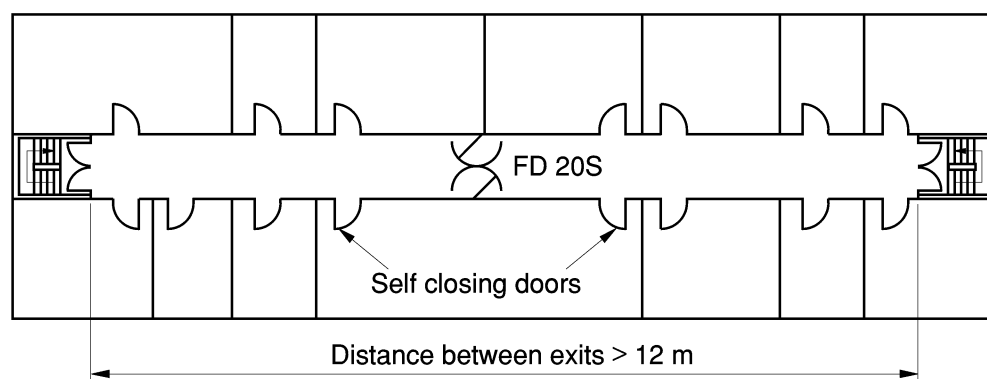


b) Example 2

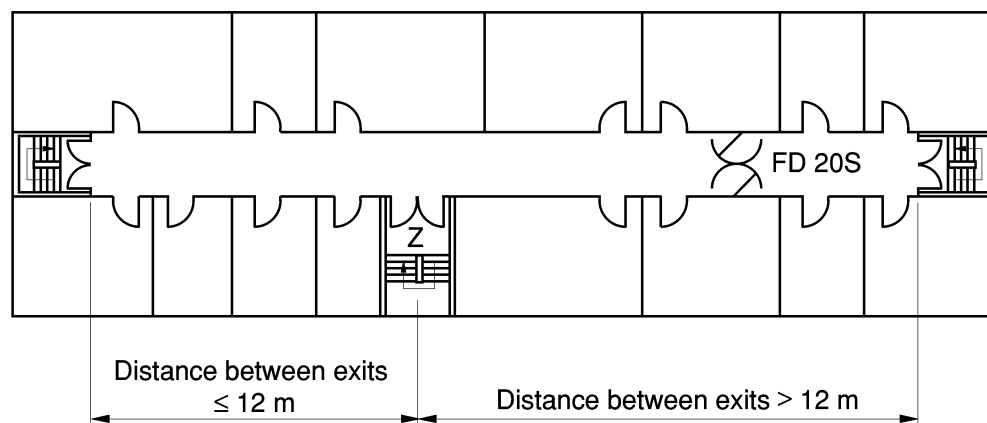
A corridor connecting both stairs should be divided both sides of the central core by doors arranged as indicated in a) or b).

<sup>1)</sup> Stairs require lobby approach in buildings over 20 m in height.

Figure 8 — Corridor layouts: central core

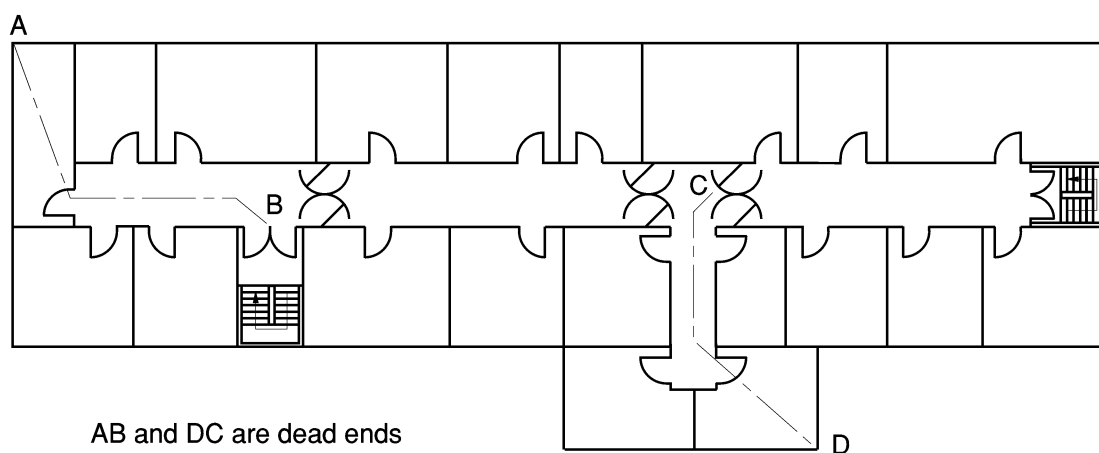


a) Corridors connecting two exits



NOTE. Doors to central stair should be at position Z

b) Corridors connecting three exits



c) Dead end corridors

Figure 9 — Corridors connecting alternative exits

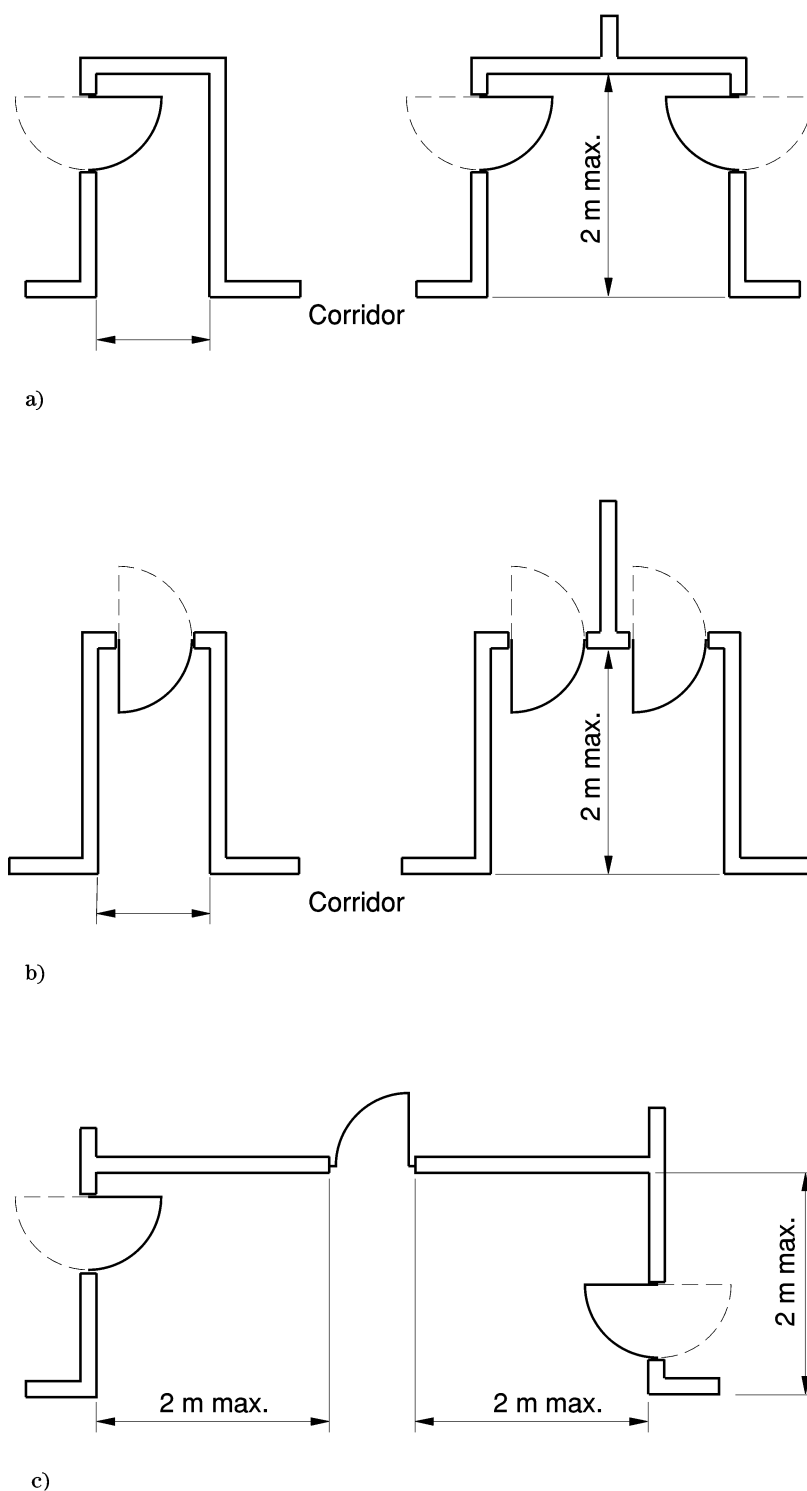


Figure 10 — Recesses off corridors