BRITISH STANDARD

BS 5588-1:1990

Reprinted, incorporating Amendments Nos. 1 and 2

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

Part 1: Code of practice for residential buildings

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British Standards

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British Gas plc
British Retailers' Association
Building Employers' Confederation
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Access Committee for England
Association of British Theatre Technicians
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Contents

		Page
Committees responsible		Inside front cover
Foreword		iii
Section 1. General		
1	Scope	1
2	Definitions	1
3	Analysis of the problem and use of the code	5
Section 2. Single-family dwelling houses		
4	Means of escape and provision for rescue	9
5	Automatic fire detection and alarm	11
6	Ducted warm air heating systems	12
Section 3. Flats and maisonettes		
7	Escape from fire	13
8	Automatic fire detection and alarm	14
9	Internal planning of flats	15
10	Internal planning of maisonettes	22
11	Alternative exits from dwellings and doors and windows for escape or rescue purposes	22
12	Escape routes from dwellings with corridor or lobby approach	26
13	Escape routes from dwellings with balcony or deck approach	27
14	Stairs and final exits	32
15	Ducted warm air heating systems	36
16	Fire safety signs	36
17	Sheltered housing	37
Section 4. Construction		
18	Construction	39
Section 5. Accommodation ancillary to flats and maisonettes		
19	General	47
20	Boiler rooms, fuel storage areas and transformer, battery and switchgear rooms	49
21	Refuse disposal and storage	49
22	Car parks	50
Section 6. Engineering services in buildings containing flats or maisonettes		
23	General	51
24	Gas services	51
25	Electrical services	52
26	Lighting	52
27	Heating systems	53
28	Mechanical ventilation and air conditioning	54
29	Refuse incinerators	54

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Page

Section 7. Fire protection facilities for buildings containing flats or maisonettes
30 General 55
31 Fire detection and alarm systems 55
32 Special risk protection 56
33 Manual firefighting equipment 57
34 Water supplies for firefighting 57
35 Access for firefighting 58
36 Smoke control for means of escape 58
37 Smoke control for firefighting 60
38 Plans for fire service use 61

Section 8. Advice to owners and occupiers of flats and maisonettes 63

Appendix A Bibliography 65
Appendix B *Deleted* 65
Appendix C Development of fire 66
Appendix D Smoke alarms in the home 67

Publications referred to 75

Figure 1 — Alternative arrangements for escape via the ground storey in houses exceeding 4.5 m in height 10
Figure 2 — Fire separation in houses exceeding 4.5 m in height by more than one floor level 12
Figure 3 — Flat with an alternative exit 17
Figure 4 — Flat with a protected entrance hall and restricted travel distance 18
Figure 5 — Flat with restricted travel distance 18
Figure 6 — Flat (entered from above or below) with an alternative exit 19
Figure 7 — Flat (entered from below) with a protected entrance hall and restricted travel distance 20
Figure 8 — Flat (entered from below) with a restricted travel distance 21
Figure 9 — Maisonette with alternative exits from each room not on the floor of entrance 23
Figure 10 — Maisonette with protected entrance hall and landing 24
Figure 11 — Open-plan maisonette 25
Figure 12 — Common escape routes in single stair buildings more than 11 m in height 28
Figure 13 — Common escape routes in multi-stair buildings 29
Figure 14 — Common escape routes in small single stair buildings 30
Figure 15 — Common escape routes in balcony/deck approach buildings 31
Figure 16 — Fire resistance of areas adjacent to external stairs 35
Figure 17 — Furnished areas in sheltered housing corridors 38

Table 1 — Limitations on non-insulating fire-resisting glazed elements installed in buildings containing flats or maisonettes 41
Table 2 — Maximum travel distances in areas of ancillary accommodation 48
Table 3 — Structural fire protection of areas of ancillary accommodation 48

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Foreword

This part of BS 5588, prepared under the direction of the Fire Standards Policy Committee, is a revision of BS 5588-1.1:1984 and CP 3:Chapter IV-1:1971, which are withdrawn.

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

Other parts of BS 5588 which are already published are as follows:

— *Part 0: Guide to fire safety codes of practice for particular premises/applications*;

— *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*;

— *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 11: Code of practice for shops, offices, industrial, storage and other similar buildings;*

— *Part 12: Managing fire safety*.

The only significant change from the text of BS 5588-1.1:1984 is the addition of a recommendation for the provision of some form of automatic fire detection and alarm equipment.

Some of the more important changes from the text of CP 3:Chapter IV-1:1971 are as follows.

a) This code covers flats and maisonettes in any type of building and in blocks of any height, including flats in blocks of not more than two storeys, which were previously covered in CP 3:Chapter IV:1948.

b) This code includes recommendations specific to sheltered housing.

c) In Section 2, Section 3, Section 4, Section 5, Section 6 and Section 7 the commentary on the relevant principles is followed by any recommendations that are made. The specific recommendations do not form a separate section of the code as in CP 3:Chapter IV-1.

The commentary on the relevant principles is intended to provide an explanatory background to any recommendations which might otherwise appear to be arbitrary. Structural precautions against fire that have to be implemented, for example those required in connection with building regulations, if discussed are not repeated as recommendations, but reference may be made to them if the requirements are not consistent in all parts of the UK.

d) Although CP 3:Chapter IV-1 included details of two alternative methods of smoke control termed “smoke containment” and “smoke dispersal” for the horizontal escape routes from dwellings to stairways, both methods had disadvantages (e.g. the provision of cross-corridor doors and/or permanent ventilation) which were subject to abuse by building occupiers.

Improved fire doors incorporating smoke seals that secure a high degree of protection against the ingress of smoke are now available, and this code therefore incorporates provisions for smoke control in these areas which, on the one hand, seek to maximize the satisfactory operation of its component parts and, on the other, reflect the lower risk involved.

NOTE The omission of “smoke containment” and “smoke dispersal” does not mean that these methods will not be satisfactory.

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This code also formally recognizes that the pressurization of escape routes is an acceptable form of smoke control.

e) Permanent ventilation to common corridors and stairways in buildings containing flats and maisonettes is not acceptable to occupiers and hence is no longer recommended.

f) The provision of a protected entrance hall is now but one of several ways of providing a safe escape route within a flat or maisonette.

g) Fire doors are no longer referred to by "type"; instead reference is made to their performance in fire tests.

h) Designs using subsidiary stairs are not recommended and therefore are no longer included.

i) Linking balcony designs for flats and maisonettes are no longer included because they do not necessarily provide a place of safety.

j) It is recommended that all dwellings are provided with some form of automatic fire detection and alarm equipment.

A bibliography on fire in dwellings is given in Appendix A.

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.

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 **3.6**, **3.7** and Clauses **22** and **24**.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 75 and a back cover.

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Section 1. General

1 Scope

This part of BS 5588 provides recommendations and guidance for designers and building construction teams in their task of incorporating into the following buildings measures that should, in the event of fire, safeguard the lives of people residing in, or visiting, such buildings, and that may help to protect the building against the effects of fire.

a) New houses of any height used as single-family dwellings, or alterations to existing houses similarly used.

b) New buildings of any height containing flats, maisonettes or sheltered housing, or alterations to existing such buildings.

c) Conversions of existing non-residential premises to form dwellings.

Hostels, houses in multiple occupation, caravans and mobile homes are not covered. Requirements for means of escape from caravans and mobile homes are given in BS 3632.

This code includes recommendations on the measures and equipment necessary for preventing the rapid spread of fire and for those required to assist firefighting in buildings with upper storeys beyond the reach of mobile fire appliances operating outside the building. It makes specific recommendations in terms of protection, number and position of exits, provides guidance on design principles for preventing the spread of fire and indicates the fire precautions necessary in these buildings.

Guidance for owners of buildings containing flats or maisonettes to aid them in making the best use of the design features of the building, and to act as a guide to designers in passing to their clients information about fire precautions designed into a building is contained in BS 5588-12.

Advice to occupiers of domestic residential buildings on precautions against fire that they may take is contained in BS 5588-12.

This code is not intended to apply to buildings during the course of construction or alteration.

Flats and maisonettes provided with their own entrances situated at ground or access level (i.e. not through any common stair or shared internal circulation space) should be designed on the basis of the recommendations given in Section 2 of this code. Examples of such buildings or developments would include housing schemes on sloping sites with car parking beneath, and terraces having flats at basement level with maisonettes above.

NOTE The titles of the publications referred to in this standard are listed on page 76.

2 Definitions

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

2.1
access level
a level used for normal access to the building that either incorporates, or leads directly to, a place of safety

2.2
access room
a room through which passes the only escape route from an inner room

2.3
alternative escape route (from a house)
a route from any point within a room of a house that gives easy access to a second stair, a balcony or a flat roof by means of which a person can reach a place free from danger from fire

2.4
alternative exit (from a flat or maisonette)
one of two or more exits from within a flat or maisonette, each of which is separate from the other

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2.5
ancillary accommodation
all parts of the building that are ancillary to the dwellings, such as rooms associated with engineering services, common amenity areas (see **2.8**), refuse rooms, covered car parks, etc.

2.6
balcony access/balcony approach
a design in which each dwelling is approached externally via an open balcony (see also **2.12**)

2.7
basement
a storey that is below the ground storey (see **2.25**)

2.8
common amenity areas
areas such as kitchens, laundries, drying areas and occupiers' stores that are remote from individual dwellings

2.9
common stair
a protected stairway which forms part of a vertical escape route finally leading to the outside of a building at podium or ground level

2.10
corridor access/corridor approach
a design in which each dwelling is approached via a common horizontal internal access or circulation space which may include a common entrance hall

2.11
dead end
an area from which escape is possible in one direction only

2.12
deck access/deck approach
similar to balcony access; a term often used to indicate a wide approach balcony but not enclosed (see also **2.6**)

2.13
depth (of a building)
the level of the surface of the lowest point of the floor of the lowest storey, 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

2.14
dwelling
a single-family dwelling house, self-contained flat or maisonette

2.15
dwelling of origin
a dwelling in which a fire has originated

2.16
escape lighting
lighting provided, for use when the supply to the normal lighting fails, to ensure that the escape route(s) is (are) illuminated at all material times

2.17
escape route
a route forming part of the means of escape from any point in a building to a final exit

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2.18
final exit
the termination of an escape route from a building giving direct access to a street, passageway, walkway or 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

2.19
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

2.20
firefighting lift
a lift designated to have additional protection with controls that enable it to be used under the direct control of the fire service in fighting a fire

2.21
firefighting lobby
a protected lobby for providing access from a firefighting stair to dwellings and to the firefighting lift

2.22
firefighting stair
a protected stairway communicating with dwellings only through a firefighting lobby

2.23
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

2.24
flat
a dwelling, forming part of a larger building, that has all its rooms on one level or, in the case of "split level" flats, not more than half a storey height apart

2.25
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

2.26
habitable room
any room in a dwelling with the exception of any kitchen, utility room, bathroom, dressing room or WC

2.27
height (of a building)
the level of the surface of the highest point of the floor of the highest storey (excluding any such top 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

2.28
higher fire risk area
an area with a fire risk higher than that of a dwelling

2.29
house
a self-contained building used as a single-family dwelling having one or more storeys or levels, that is not horizontally separated from any other dwelling forming part of the building, and that has its own main entrance door situated at ground level or at any level that serves as ground level

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2.30
independent alternative escape route
one of two or more escape routes from a dwelling, each with its own exit from the dwelling and each of which is separate from the others

2.31
inner room
a room from which escape is possible only by passing through another room (the access room, see **2.2**)

2.32
maisonette
a dwelling, forming part of a larger building, which has its rooms divided between two or more levels which are more than half a storey height apart

2.33
material of limited combustibility
either:

a) a non-combustible material; or

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

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

2.34
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

2.35
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 nor cause any rise in the temperature on either the centre (specimen) or furnace thermocouples

2.36
open-plan dwelling
a dwelling in which the internal living arrangements are almost entirely undivided by partitions

2.37
place of safety
a place in which persons are in no danger from fire

2.38
pressurization
a method of protecting escape routes against the ingress of smoke by maintaining the air within them at pressures higher than those in adjacent parts of the building

2.39
protected circuit
an electrical circuit protected against fire

2.40
protected entrance hall/landing
a circulation area consisting of a hall or space within the dwelling enclosed with fire-resisting construction (other than any part which is an external wall of a building)

2.41
protected lobby/corridor
a circulation area consisting of a lobby or a corridor enclosed with fire-resisting construction (other than any part that is an external wall of a building)

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2.42
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 adequately protected from fire elsewhere in the building by fire-resisting construction

2.43
self-closing fire door
a fire door fitted with a device which fully closes the door overriding the resistance of any latch

2.44
sheltered housing
blocks of flats and/or maisonettes, with each dwelling incorporating its own cooking and sanitary facilities, designed specifically for persons who might require assistance, e.g. elderly people, and where some form of assistance is available at all times

NOTE 1 This should not be taken as implying that assistance need be provided on the premises.

NOTE 2 Sheltered housing usually includes amenities common to all occupiers such as lounges, guest rooms, etc.

2.45
single stair
a common stair which is the only one to which dwellings in a block of flats or maisonettes have access

2.46
storey exit
a final exit, or a doorway giving direct access to a protected stairway or external escape route

2.47
travel distance
the actual distance to be travelled by a person along an escape route

NOTE Recommendations for maximum travel distances may apply to travel within dwellings and ancillary accommodation, and from dwellings and ancillary accommodation to storey exits.

3 Analysis of the problem and use of the code

3.1 Planning in relation to fire

The only sound basis for designing means of escape from fire is to attempt to locate the positions of all possible sources of outbreak of fire, and to predict the courses that might be followed by the fire as it develops or, more particularly, the risks to the occupants that smoke and hot gases are likely to produce. Only against this background is it possible to design and protect escape routes with some certainty that they will be safe.

NOTE A more detailed description of the development of fire in buildings is given in Appendix C.

By far the greatest number of deaths from fire occur in houses and the majority of these deaths are of children or old people. However, this is a consequence of the greater number of these buildings that exist in comparison with other types of building, rather than an indication of a high level of risk to life in houses. Although there is a significant risk of outbreak of fire in the average house, the prospects of escape are good. Fire occurring anywhere within a house has to be regarded as offering an immediate risk to all occupants even though in the initial stages of fire development it might seem that persons are well removed from immediate danger.

Many buildings containing flats and/or maisonettes have been built with storeys so high above ground level that a proportion of residents live without any possibility of escape or rescue from windows or balconies. In spite of this, the number of deaths and dangerous incidents have been remarkably small: lower, indeed, in relation to numbers, than in ordinary dwelling houses. Careful attention to detail in the planning and construction of flats and maisonettes in the light of the risks that can be shown to exist from the outbreak and development of a fire in a dwelling should ensure that this good record is maintained.

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In buildings containing flats and/or maisonettes designed, maintained and supervised in accordance with this code, the risk of fire starting in corridors, lobbies or stairways intended for use only for access or means of escape may be regarded as negligible as long as they are kept clear of obstructions, and adequate and convenient protected storage space is provided. It is also unlikely that fire will originate in the structure itself.

It is worthy of note that research into the burning characteristics of furniture suggests that the materials used in present-day furniture may well give rise to greater dangers from fire in a dwelling than was the case with traditional materials. Certain polymeric materials commonly used in the manufacture of furniture are capable of producing greater volumes of smoke and other combustion products in a given time, and a hotter fire, and may respond to an increase in air supply by producing yet greater volumes of smoke and combustion products.

3.2 Fire development within a dwelling

It is within the house, flat or maisonette itself that the most direct and serious risks to life arise. The following three situations can be identified.

a) A fire may be started in an occupied room by the actions of an occupant, such as by deep fat frying, smoking in bed or children playing with matches. The risk to the occupant will be severe, but it is to be hoped that he or she will be able to make his or her way to the door and give the alarm to other occupants. If this is done, and the door of the room of origin is closed, the fire will be initially confined to that room before involving the rest of the dwelling should the fire continue to develop; this may take an appreciable time to occur.

If the occupant of the room is overcome by the fire and unable to give the alarm, while the room door remains closed the effect outside the room will be similar to that just described, except that there may well be a delay in realizing that a fire exists. If, however, the room door is left open, there is risk that the products of combustion will fill those parts of the dwelling to which they can obtain access, including the stairway and any rooms with open doors, and this will threaten the escape of other occupants. The risk is more serious in houses with storeys above the ground storey and in maisonettes rather than in flats, as are all the risks associated with fire, due to the greater speed with which heat transfer takes place upwards rather than sideways.

b) A fire may start in an unoccupied room because of discarded smoking materials, electrical faults, furniture left too close to heating appliances, etc. The risk will be to all occupants of the dwelling, particularly any who may be asleep, but a fire will take time to develop unless the room door is open. If the latter is the case, an immediate danger arises of other occupants being trapped by the presence of the products of combustion between them and the exit door of the dwelling. If the door of the room of origin is closed, the fire will not emerge from the room for some time, during which the occupants may become aware of it. If they do not, their escape will be threatened when the products of combustion penetrate the door of the room of origin; the more so in a multi-storey situation when smoke permeates the stairway or fire penetrates the ceiling of the room of origin.

c) Conceivably, a fire may start or be started in the entrance hall or circulation spaces (corridors, stairways, etc.) of the house, flat or maisonette, which will present the most immediate and severe danger possible to the occupants, particularly on any upper floor. For this reason, it is essential to ensure, so far as possible at the design stage, that the potential for a fire starting in an entrance hall or circulation space is minimized.

3.3 Fire development outside the dwelling

The risks to occupants of other dwellings from a fire in another dwelling are parallel to, but much less direct than, the risks to the occupants of the dwelling of origin. The corresponding situations are as follows.

a) In the case of semi-detached or terraced houses, the risk to occupants of an adjoining house will only arise if the fire spreads through the separating walls, or across the face of the building from one window to another or by radiated heat from a fire in adjacent premises.

b) A fire in an occupied flat or maisonette is discovered by the occupants, who make their way out and leave the door closed, presumably then giving the alarm. The fire should present little or no risk to the occupants of other dwellings if they remain within their own dwelling as it will not break out of the dwelling of origin for some considerable time (during which, no doubt, the fire service will deal with the fire).

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If extinction of the fire is delayed, there will be a direct risk to persons using any common access, through smoke and heat affecting the route, and the fire may begin to penetrate to other dwellings. If the dwelling entrance door is left open after the occupants' departure, any access corridor will be quickly filled with the products of combustion, and other occupants trying to use the corridor will be in serious difficulty.

c) A fire may start (or be started) in an unoccupied dwelling, there will be no one to give the alarm, and the fire may develop fully within the dwelling before other occupants are aware of it. After a time the dwelling entrance door will be penetrated, as in item b), and with the same consequences. If the dwelling entrance door gives on to an open balcony rather than an internal corridor, smoke would be of little consequence but, at a later stage, there could be difficulty in passing the door.

d) A fire may start (or be started) in an access corridor, lobby or stairway, or in ancillary accommodation, in a building containing flats or maisonettes. This is capable of rendering all circulation spaces, including stairways, impassable in a short time unless provision had been made in the design of the building to prevent it. Complete safety cannot be assured, moreover, while there is any risk that a fire may start in escape routes or circulation spaces. It is essential, therefore, that, as in **3.2**c), the building is furnished and used in such a way as to reduce the risk that fire will occur in circulation spaces.

e) In mixed user buildings it is important to consider the effect of one risk upon another. A fire in an unattended office or shop premises could have serious consequences on any dwelling in the same building.

3.4 Safety measures

Against the risks described in **3.2** and **3.3**, the designer has available to him the following safeguards:

a) automatic fire detection and alarm;

b) structural fire barriers between dwellings;

c) structural fire barriers between dwellings and common escape routes, i.e. circulation spaces such as corridors, lobbies, stairways, etc.;

d) structural fire barriers within dwellings;

e) self-closing fire-doors;

f) selective positioning of rooms within dwellings;

g) alternative exits and escape routes from rooms and dwellings;

h) restriction of travel distances;

i) provision for the control of smoke.

NOTE Item c) is not applicable to houses, and items h) and i) are not normally necessary nor practicable in houses.

3.5 Site planning

The siting of residential buildings is usually 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. Building regulations accordingly require adequate separation between the side of any building and its boundary. At the planning stage access to buildings by fire appliances and the effects of car parking adjoining the building should be considered and the fire authority consulted. 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.

3.6 Relationship with statutory provisions

3.6.1 *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. The relevant legislation indicated in general terms in **3.6.2** 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 from fire as well as the safety of the occupants.

3.6.2 *Building regulations*

The design and construction of new buildings, and of 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).

It should be noted that some county and other authorities in England and Wales have local powers in respect of fire precautions.

3.7 Disabled persons

In addition to the guidance given in BS 8300, there is legislation governing access for the disabled into and within buildings which the designer will need to study.

3.8 Use of the principles and application of the recommendations

A basic understanding of the principles associated with the inherent fire risk and the spread of fire in residential buildings is essential for the correct application of the recommendations.

Individual recommendations of this code should not be applied in isolation because of their interdependence: to secure maximum benefit all of the appropriate recommendations need to be applied. Although the basic principles and recommendations for escape from dwellings are described in Section 2 and Section 3, the most conscientious application of these recommendations would be undermined unless supported by the necessary measures relating to construction, ancillary accommodation, engineering services and fire protection facilities set out in Section 4, Section 5, Section 6 and Section 7.

3.9 Distances of travel

Many recommendations include a limitation on the distance of travel between two points: these are based on past experience and practice and represent the maximum distance a person can reasonably be expected to walk to escape from fire. 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.

3.10 Diagrams

The figures in this code are intended to clarify concepts and form an integral part of the recommendations. However, they should not be taken as indicating the only acceptable forms of planning of dwellings or storeys. Features (such as windows) not relevant to the concepts or principle(s) being illustrated are not shown.

3.11 Information to be given to clients

Designers are advised to inform their clients of the nature, function and (if necessary) limitations of the fire precautions that have been designed into the building, and especially those whose nature may be less evident. This will enable a better understanding of the responsibility for ensuring that a high standard of safety is maintained.

The recommendations provided in BS 5588-12 is intended not only as a guide to the owner of buildings containing flats and/or maisonettes, but also as a guide to the information concerning the fire precautions that have been designed into the building which designers are advised to pass to their clients.

BS 5588-12 has an annex containing information regarding fire safety advice for occupiers of flats and maisonettes.

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Section 2. Single-family dwelling houses

4 Means of escape and provision for rescue

4.1 Commentary

Few houses have more than one stair. Because of the risk that a single stairway may be blocked by smoke, other escape routes from basements or upper storeys may need to be contemplated. From first floor level these other escape routes may have to be via openable windows (or a door to a balcony) from which rescue should be possible. In an open-plan dwelling, unless the stairway is enclosed, the upper floor bedrooms will be inner rooms (see **2.31**) and hence need to be provided with openable windows or a door to a balcony.

With houses having one or more floors situated more than 4.5 m above ground or access level [a traditional three (or more) storey house], protection of the single stairway is necessary. Where houses have one or more floors situated 7.5 m or more above ground or access level [a traditional four (or more) storey house], it is necessary to provide alternative means of escape from the upper floors without reliance on a single protected stairway.

Similarly, escape from any bedroom within a basement should not rely on access being available solely by way of the ground storey.

In the planning of single storey houses it is preferable that bedrooms (or any rooms likely to be used for sleeping) do not form inner rooms.

Lowering lines and portable, retractable and throw-out ladders are not considered to be a suitable alternative to permanent means of escape (although occupants may wish to provide them as additional means of escape). Vertical or raking ladders permanently fixed in the position required will only be suitable in exceptional circumstances.

4.2 Recommendation for houses not exceeding 4.5 m in height

A habitable room should not be an inner room unless it is provided with a door or window complying with **4.7** for escape or rescue purposes.

4.3 Recommendations for houses exceeding 4.5 m in height by one floor level

The following recommendations are applicable.

a) A habitable room should not be an inner room unless:

1) it has a floor level not more than 4.5 m above ground or access level; and

2) it is provided with a door or window complying with **4.7** for escape or rescue purposes.

b) Unless the top story or level is separated from the lower storeys by fire-resisting construction and is provided with an alternative escape route leading to its own final exit, the internal stairway should:

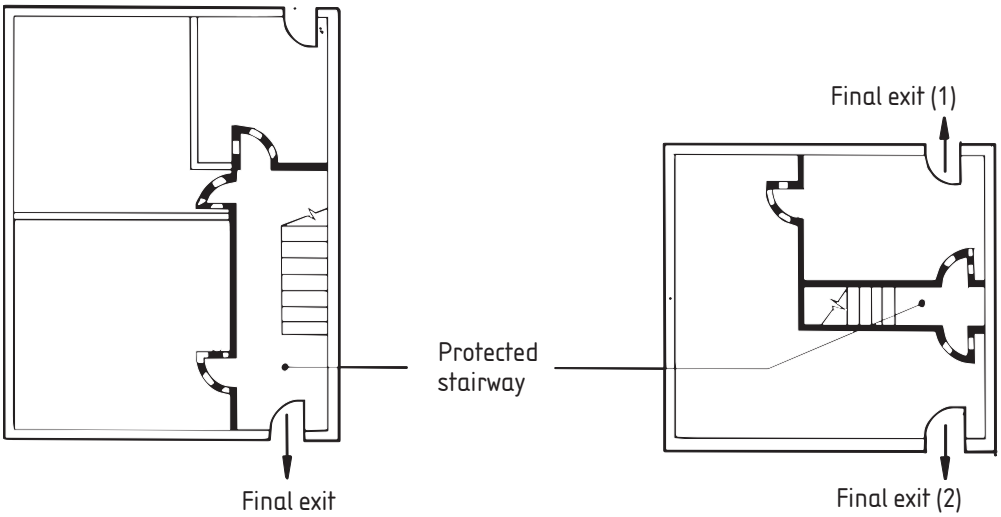
1) be constructed as a protected stairway;

2) connect the ground and all upper storeys; and

3) either

i) deliver directly to a final exit [see Figure 1(a)]; or

i) afford access to not less than two independent escape routes delivering to alternative final exits [see Figure 1(b)].



a) Protected stairway delivering directly to the final exit

b) Protected stairway affording access to two independent escape routes

Key

30 min fire-resisting construction

Self-closing FD 30 fire door

Figure 1 — Alternative arrangements for escape via the ground storey in houses exceeding 4.5 m in height

4.4 Recommendations for houses exceeding 4.5 m in height by more than one floor level

The following recommendations are applicable.

a) A habitable room should not be an inner room unless:

1) it has a floor level not more than 4.5 m above ground or access level; and

2) it is provided with a door or window complying with **4.7** for escape or rescue purposes.

b) *Text deleted.*

c) All upper floors should be served by a stair that should:

1) be constructed as a protected stairway;

2) connect the ground and all upper storeys; and

3) either:

i) deliver directly to a final exit [see Figure 1(a)]; or

i) afford access to not less than two independent escape routes delivering to alternative final exits [see Figure 1(b)].

d) An alternative escape route should be provided from each storey or level situated 7.5 m or more above ground or access level. Where the access to the alternative escape route is by way of the protected stairway (i.e. to an upper storey), or a landing within the protected stairway enclosure (i.e. to an alternative escape route on the same storey), the protected stairway at or about 7.5 m above ground or access level should be separated from the lower storeys or levels by fire-resisting construction (see Figure 2).

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4.5 Recommendations for basements

The following recommendations are applicable.

a) Any basement in which a bedroom is situated should be provided with an alternative escape route.

b) Any door or window provided for means of escape should comply with **4.7**.

4.6 Recommendation for escape by way of an external balcony or flat roof

Any alternative escape route by way of a balcony or flat roof should be defined and guarded with protective barriers in accordance with BS 6180.

4.7 Recommendations for doors and windows for escape or rescue purposes

The following recommendations are applicable.

a) Escape windows should have an unobstructed openable area that is at least 0.33 m^2 and at least 450 mm high and 450 mm wide.

NOTE 1 The route through the window may be at an angle rather than straight through.

b) The bottom of any openable area should be not more than 1 100 mm above the floor of the room in which it is situated.

NOTE 2 To provide protection against falling, building regulations will generally be satisfied if the bottom of the opening is not less than 800 mm above the floor (except for a rooflight, in which case the bottom of the opening should be not less than 600 mm above the floor).

c) Where provided for escape or rescue purposes from a room above ground level:

1) if a window is a dormer window or a roof light, the distance from the eaves of the roof to the cill or vertical plane of the window or cill of the roof light should not exceed 1.5 m when measured along the roof;

2) any doors (including a french window or a patio window) should lead to a balcony guarded with a protective barrier in accordance with BS 6180;

3) the ground beneath the window or balcony should be clear of any obstructions (such as iron railings or horizontally hung windows) and should be of a size and material suitable and safe for supporting a ladder.

4) for security purposes many windows are kept locked with a key. In such cases the key should be kept close to the escape window where it can be easily located.

5 Automatic fire detection and alarm

5.1 Commentary

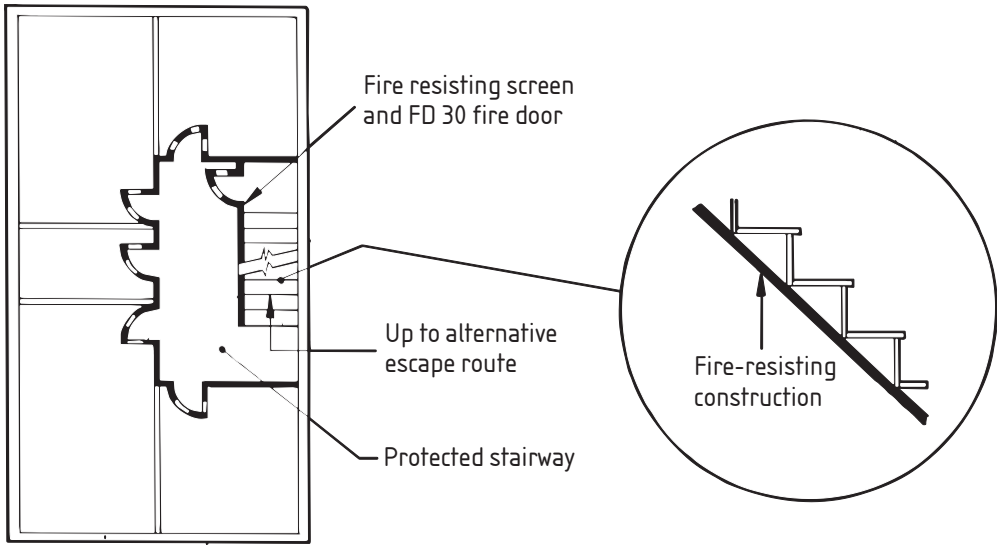
In most single-family dwelling houses the installation of self-contained smoke alarms can significantly increase the level of fire safety by automatically giving an early warning of fire. However, the use of self-contained smoke alarms, even if interconnected, is not considered to be a suitable method of protection for large private dwellings, for example a country mansion, and a full fire detection and alarm system needs to be installed to protect the occupants.

5.2 Recommendation

All houses should be provided with either:

a) self-contained mains powered smoke alarms complying with BS 5446-1 and installed as described in Appendix D of this code; or

b) a type L system designed and installed in accordance with BS 5839-1.



a) Plan of the floor at or about 7.5 m above ground

b) Section through the stair showing fire protection of the underside

Key

30 min fire-resisting construction

Self-closing FD 30 fire door

NOTE 1 The stair should be considered to be a floor for the purposes of protection.

NOTE 2 If the alternative escape route(s) for all rooms situated 7.5 m or more above ground or access level do not pass through the protected stairway, the fire-resisting screen and FD 30 fire door are not necessary.

Figure 2 — Fire separation in houses exceeding 4.5 m in height by more than one floor level

6 Ducted warm air heating systems

6.1 Commentary

With this form of heating, precautions are necessary within any house having at least one of its floors situated more than 4.5 m above ground or access level to avoid any risk that such a system (irrespective of fuel) would permit the spread of smoke or fire (whether by forced convection, natural convection or fire-induced convection) from rooms to the protected stairway.

6.2 Recommendations

The following recommendations are applicable in any house having at least one of its floors situated more than 4.5 m above ground or access level.

a) Transfer grilles should not be fitted in any wall, floor or ceiling enclosing a protected stairway.

b) All ductwork passing through the enclosure to a protected stairway should be so fitted that all joints between the ductwork and the enclosure are fire-stopped.

c) Where ductwork is used to convey warm air into a protected stairway through the enclosure of the protected stairway, the return air from the protected stairway should be ducted back to the heater.

d) Warm air and return air grilles or registers should be positioned at a height not exceeding 450 mm above floor level.

e) A room thermostat should be mounted in the living room at a height between 1 370 mm and 1 830 mm, and its maximum setting should not exceed 27 °C.

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Section 3. Flats and maisonettes

7 Escape from fire

7.1 General

Planning of means of escape from those storeys in which flats or maisonettes are situated involves a number of interrelated aspects which ought to be considered as a whole and not in isolation.

The recommendations of this code for flats, maisonettes and sheltered housing are intended to provide safety from fire by means of:

a) planning and protection of escape routes leading to safety both horizontally and downwards (and/or possibly upwards in a few special circumstances) from any area that may be threatened by fire, so enabling a person confronted by an outbreak of fire to turn and make a safe escape without outside assistance;

b) construction and finishing with suitable materials and embodying adequate fire resistance in the structure;

c) segregation of higher fire risk areas;

d) the provision of means of detecting outbreaks of fire;

e) the provision of firefighting equipment, whether for use by the occupants in containing fire in its early stages, or by way of assistance to the fire service.

Owing to the high degree of compartmentation provided in blocks of flats and/or maisonettes, the spread of fire from one dwelling to another is unusual. It is, therefore, no longer assumed that in the event of fire it is necessary to evacuate the whole building, whole floors or even dwellings adjacent to the fire.

However, the occupants of other dwellings in a building in which there is a fire in one dwelling may feel a need to leave, especially those in dwellings close to the affected one, and will seek to find their way out of the building. This is why this code places the same emphasis on the safety of escape routes outside dwellings as within them.

The risks to occupants in escape routes when escaping from fire are as follows.

1) Risk to persons in a dwelling or ancillary accommodation area from a fire in that dwelling or area.

2) Risk to persons from the effects of fire or smoke penetrating and obstructing the horizontal routes formed by protected lobbies and corridors or external escape balconies.

3) Risk to persons at all floor levels from the effects of fire or smoke penetrating and obstructing the protected stairways and protected exit route(s) to a place of safety external to the building.

To facilitate escape it is necessary that common escape routes are safeguarded by some form of smoke control.

Reliance for fire safety on manipulative apparatus, e.g. lowering lines or throw-out ladders, for means of escape, or on external rescue from the lower storeys of a building by the fire service using mobile ladders, is not satisfactory. This code provides for residents and visitors on any storey to be able to escape safely from the building without outside assistance should a fire occur.

Except in very special circumstances lifts should not be used for escape from fire. Experience in fires has shown that misuse or malfunctioning of lifts has caused a number of deaths, attributed amongst other things to failure of the power supply or from lifts being called to or held at the fire floor. Once the lift doors open in a fire area their design is normally such that they remain open, exposing the occupants to fire.

Recommendations applicable to sheltered housing, in addition to those in Clauses **8** to **16**, are given in Clause **17**.

Section 3 and Section 4 contain principles and recommendations for the planning and construction of those parts of the building that comprise flats and/or maisonettes. Other parts, ancillary to residential accommodation, are covered in Section 5 and Section 6.

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7.2 Internal planning of dwellings

Clauses **9**, **10** and **11** are concerned with the safety of occupants within their dwellings. The aim should be to ensure that a fire which starts in a dwelling will not prejudice the escape of the occupants of that dwelling. The recommendations for the internal planning of a dwelling depend on whether it is a flat or maisonette, its size, whether it is situated at or close to ground level and whether it has an independent final exit. Clauses **9** and **10** deal respectively with the internal planning of flats and maisonettes; Clause **11** deals with alternative exits from flats and maisonettes.

However, dwellings entered directly from outside the building at ground level are basically no different from houses: the recommendations made for houses in Section 2 of this code apply (see **9.2** and **10.2**), and the recommendations in Clauses **11**, **12**, **13** and **14** do not apply.

7.3 Escape routes from dwellings

Clauses **12**, **13** and **14** are concerned with the safety of occupants using that part of the escape route which leads from the exit of an individual dwelling to a final exit.

The aim should be to ensure that a fire which starts in any one dwelling will not obstruct the escape route of the occupants of any other dwelling. The planning of this part of the escape route depends on the number of common stairs serving the storey, the arrangement of the dwellings within the building and, in particular, the normal method of approach to dwellings having a common access (i.e. by an internal corridor or lobby or an external balcony or deck).

The provisions of these clauses apply equally to all types of dwellings except for those entered directly from outside the building at ground or access level. Similarly, small buildings, which may require somewhat different considerations, are dealt with in **12.2**. Although it is preferable for the layout of common means of escape to be uniform throughout a building, there may be situations, for example a large low block which incorporates a tower, where this is not practicable. In such cases the lowermost four storeys of higher buildings may also be designed on a similar basis to that appropriate for small buildings provided that an alternative escape route (or routes) is (are) provided from each and every storey other than the lowermost four.

Clauses **12** and **13**, which deal with horizontal escape along common escape routes to storey exits, make recommendations according to the degree of smoke control provided.

Clause **14** deals with vertical travel down or up a stair towards a final exit. Lifts are disregarded for purposes of escape unless they are evacuation lifts in sheltered housing.

Means of escape from communal areas in sheltered housing are covered in **17.4** and from ancillary accommodation in **19.1**.

8 Automatic fire detection and alarm

8.1 Commentary

This code has been prepared on the principle that the only sure way to secure the safety of occupants whose dwelling is attacked by fire is to enable them to leave without delay, and this is best achieved by the provision of automatic fire detection and alarm equipment. In situations, therefore, where the occupants are faced with a fire in their own dwelling, evacuation of the dwelling is accepted as the only safe course; reliance should not be placed on successfully attacking the fire or rescue by the fire service as a means of ensuring occupant safety.

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8.2 Recommendations

The following recommendations are applicable.

a) All sheltered housing flats and maisonettes should be protected by automatic fire detection and alarm equipment as described in **31.2**c).

b) An automatic fire detection and alarm system protecting any part of a mixed user building should also protect any flat or maisonette in that building [see **31.2**d)].

c) All dwellings in buildings not protected by an automatic fire detection and alarm system should be provided with either:

1) self-contained mains powered smoke alarms complying with BS 5446-1 and installed as described in Appendix D of this code; or

2) a type L system designed and installed in accordance with BS 5839-1.

9 Internal planning of flats

9.1 Commentary

Flats range in size from those consisting of a single habitable room to those larger than many single-family dwelling houses, with many habitable rooms. However, irrespective of size, two basic considerations apply: firstly it is necessary to ensure that the internal planning of a flat is such that a fire anywhere in the flat will not trap the occupants; and secondly it is necessary to ensure that escape is possible from the flat in which a fire has broken out. It is essential, particularly in open-plan dwellings, that cooking facilities are so located that occupants when escaping can turn their backs to any fire in this area.

Some flats, particularly those provided in existing buildings with very high ceilings, incorporate galleries that may be used, for example, for sleeping accommodation. Such areas will be subject to additional risks unless provisions additional to those in otherwise identical non-galleried accommodation are made.

There are several ways of providing safe escape routes: the provision of an alternative exit; ensuring that the escape route from any habitable room is by way of a protected entrance hall within which no likely source of fire exists, and within which the travel distance is limited; or by the limitation of the travel distance from any point in the flat to the flat entrance door. However, where a flat is entered from a floor above the flat, the likelihood that the stair up to the flat entrance door would become smoke-logged is such that an alternative exit is necessary: suitable forms of alternative exit are discussed in Clause **11**.

These constraints are unnecessary in the case of ground floor flats entered from outside the building and for flats situated above the ground floor provided with their own external entrance at ground level. Similar considerations apply to flats entered from a first floor podium.

9.2 Recommendation for flats provided with an independent external entrance at ground or access level

The dwelling should comply with the appropriate recommendations in Section 2.

9.3 Recommendations for basement flats

The following recommendations are applicable.

a) No flat should be so planned that any habitable room is an inner room unless that room is provided with a door or window complying with **11.5** for escape or rescue purposes.

b) A basement flat that is not provided with its own external entrance at the level of the basement should be provided with an alternative exit (see **11.2**).

9.4 Recommendation for flats situated not more than 4.5 m above ground or access level

No flat should be so planned that any habitable room is an inner room unless that room is provided with a door or window complying with **11.5** for escape or rescue purposes.

9.5 Recommendations for flats situated more than 4.5 m above ground or access level and entered at the same level as the flat

The following recommendations are applicable.

a) No flat should be so planned that any habitable room is an inner room.

b) The flat should be so planned that:

1) an alternative exit is provided (see Figure 3 and Clause **11**) and, where habitable rooms do not have direct access to the entrance hall, a fire-resisting partition should separate the living and sleeping accommodation [see Figure 3(b)]; or

2) all habitable rooms are entered directly from a protected entrance hall, and the travel distance from the flat entrance door to the door of any habitable room does not exceed 9 m (see Figure 4); or

3) both:

i) the travel distance from the flat entrance door to any point in any habitable room does not exceed 9 m (see Figure 5); and

ii) the position of any cooking facilities is remote from the dwelling entrance door and does not prejudice the escape route from any point in the flat.

9.6 Recommendations for flats situated more than 4.5 m above ground or access level and entered from the floor below the flat

The following recommendations are applicable.

a) No flat should be so planned that any habitable room is an inner room.

b) The flat should be so planned that:

1) an alternative exit is provided from the upper floor level (see Figure 6 and Clause **11**) and, where habitable rooms do not have direct access to the landing, a fire-resisting partition should separate the living and sleeping accommodation [see Figure 6(b)]; or

2) all habitable rooms are entered directly from a protected landing, and the travel distance from the head of the stair to the door of any habitable room does not exceed 9 m (see Figure 7); or

3) both:

i) the travel distance from the head of the stair to any point in any habitable room does not exceed 9 m (see Figure 8); and

ii) the position of any cooking facilities is remote from the head of the stair and does not prejudice the escape route from any point in the flat.

9.7 Recommendations for flats situated more than 4.5 m above ground or access level and entered from the floor above the flat

The following recommendations are applicable.

a) No flat should be so planned that any habitable room is an inner room.

b) An alternative exit should be provided from the lower floor level (see Figure 6 and Clause **11**) and, where habitable rooms do not have direct access to the landing, a fire-resisting partition should separate the living and sleeping accommodation [see Figure 6(b)].

9.8 Recommendations for flats with galleries

The following recommendations are applicable (in addition to those of **9.3**, **9.4**, **9.5**, **9.6** and **9.7**).

a) The main level of the flat should be planned in accordance with the principles illustrated in Figure 4, Figure 5(a) or Figure 5(b).

b) Unless the cooking facilities are enclosed with fire-resisting construction, any cooking facilities within a room containing a gallery should be remote from the stair to the gallery and positioned such that they do not prejudice the escape route from the gallery.

c) The distance between the foot of the access stair to the gallery and either the flat entrance door or a door leading to a protected entrance hall should not exceed 3 m.

d) An alternative exit should be provided from a gallery if the travel distance from the head of the access stair to the gallery to any point in the gallery exceeds 7.5 m.

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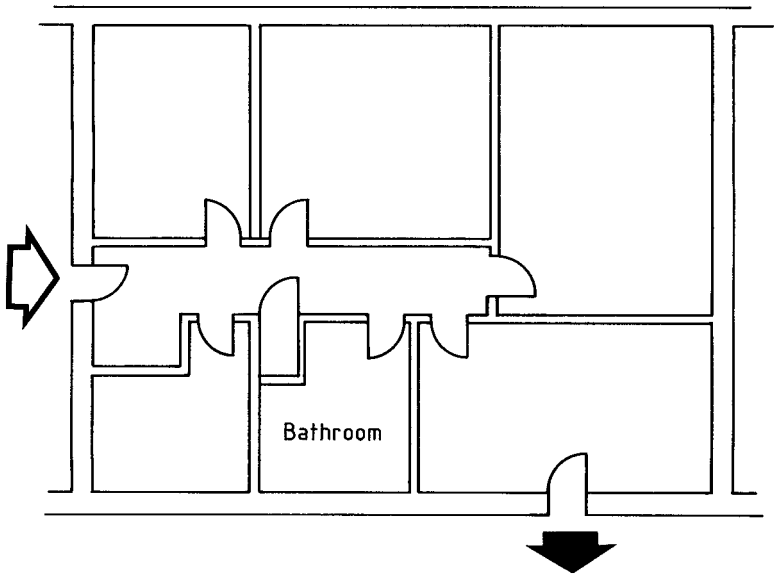
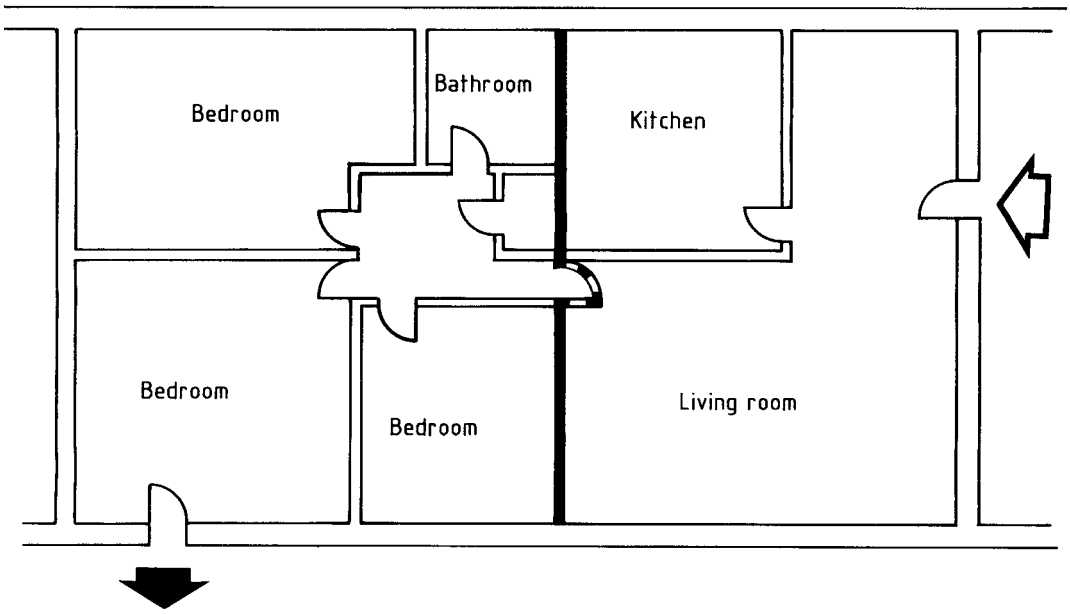


(a) Flat where all habitable rooms have direct access to an entrance hall



NOTE 1. The fire-resisting partition should separate living and sleeping accommodation.

NOTE 2. The bedrooms are not classed as inner rooms because escape is possible in two directions.

(b) Flat where all habitable rooms do not have direct access to an entrance hall

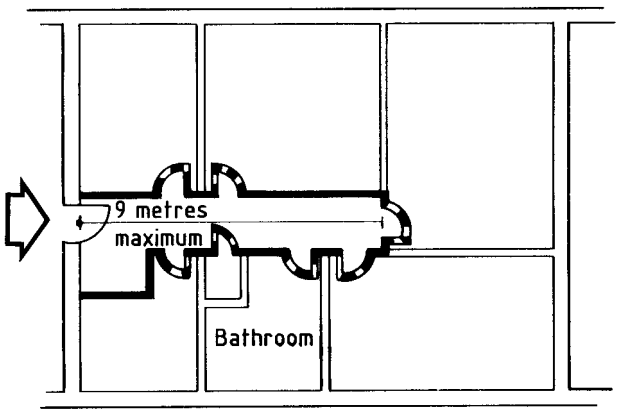
Key:

- Entrance to dwelling
- Alternative exit from dwelling
- 30 min fire-resisting construction
- Self-closing FD 20 fire door

NOTE 3. The entrance and alternative exit doors may need to be fire doors (see **18.6.2**).

NOTE 4. Compartment walls need to be fire resisting (see **18.3.2**(b)).

Figure 3 — Flat with an alternative exit



Key: Entrance to dwelling

Self-closing FD 20 fire door

30 min fire-resisting construction

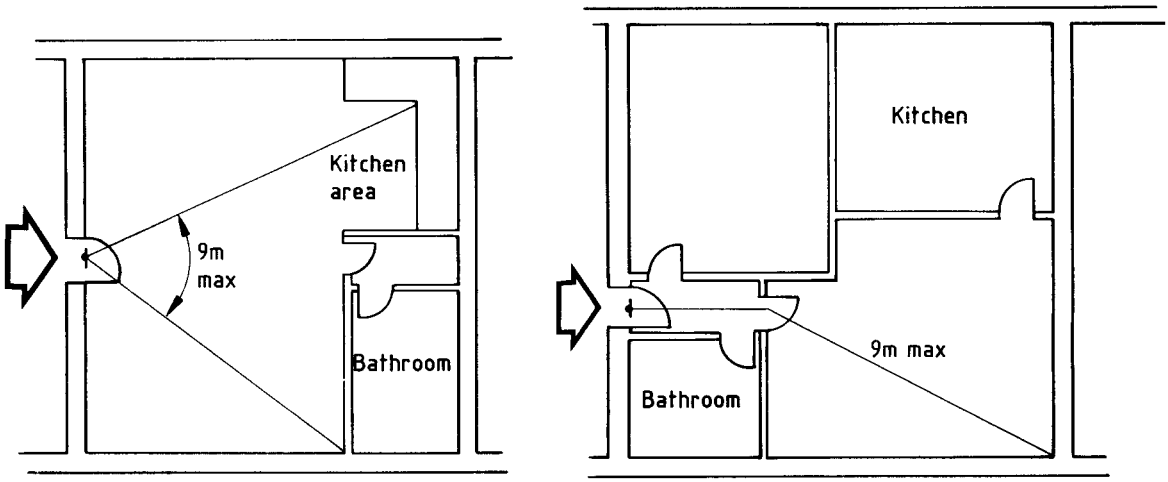
NOTE 1. The entrance door may need to be a fire door (see **18.6.2**).

NOTE 2. If the partitions between the bathroom and the adjacent rooms have a 30 min fire resistance then the partition between the bathroom and the hall need not be fire-resisting and the bathroom door need not be a fire door.

NOTE 3. The cupboard door need not be self-closing.

NOTE 4. Compartment walls need to be fire-resisting (see **18.3.2**(b)).

Figure 4 — Flat with a protected entrance hall and restricted travel distance



(a) Open-plan flat (bedsitter)

(b) Flat with separate habitable rooms

Key: Entrance to dwelling

NOTE 1. The entrance door may need to be a fire door (see **18.6.2**).

NOTE 2. Compartment walls need to be fire-resisting (see **18.3.2**(b)).

Figure 5 — Flat with restricted travel distance

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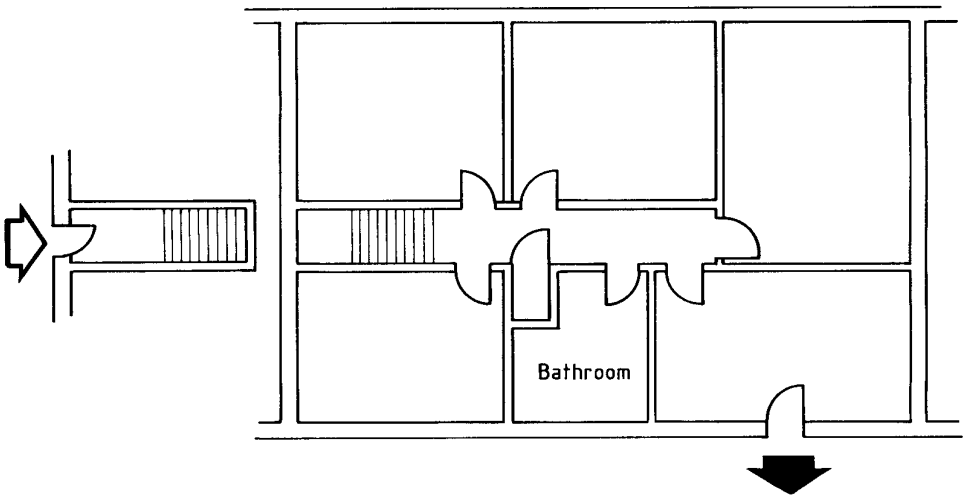
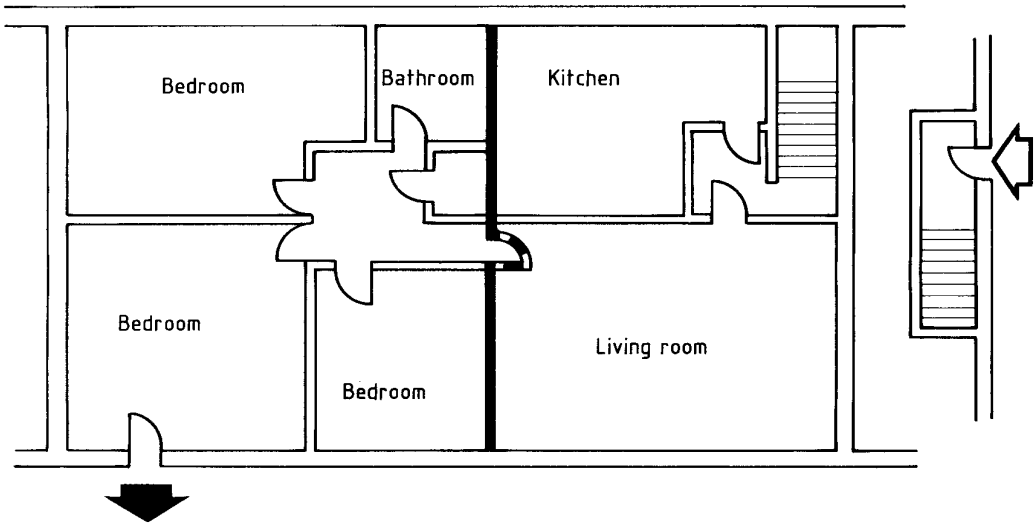


(a) Flat where all habitable rooms have direct access to an entrance hall



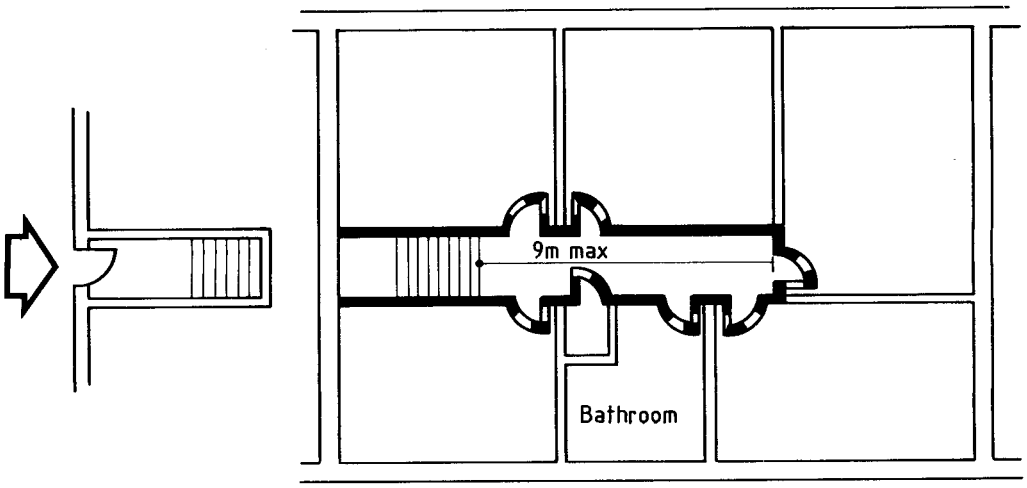
NOTE 1. The fire-resisting partition should separate living and sleeping accommodation.
NOTE 2. The bedrooms are not classed as inner rooms because escape is possible in two directions.

(b) Flat where all habitable rooms do not have direct access to an entrance hall

Key:
- Entrance to dwelling
- Alternative exit from dwelling
- 30 min fire-resisting construction
- Self-closing FD 20 fire door

NOTE 3. The entrance and alternative exit doors may need to be fire doors (see **18.6.2**).
NOTE 4. Compartment walls need to be fire-resisting (see **18.3.2**(b)).

Figure 6 — Flat (entered from above or below) with an alternative exit



Key: Entrance to dwelling

30 min fire-resisting construction

Self-closing FD 20 fire door

NOTE 1. The entrance door may need to be a fire door (see **18.6.2**).

NOTE 2. If the partitions between the bathroom and the adjacent rooms have a 30 min fire resistance then the partition between the bathroom and the hall need not be fire-resisting and the bathroom door need not be a fire door.

NOTE 3. The cupboard door need not be self-closing.

NOTE 4. Compartment walls need to be fire-resisting (see **18.3.2**(b)).

Figure 7 — Flat (entered from below) with a protected entrance hall and restricted travel distance

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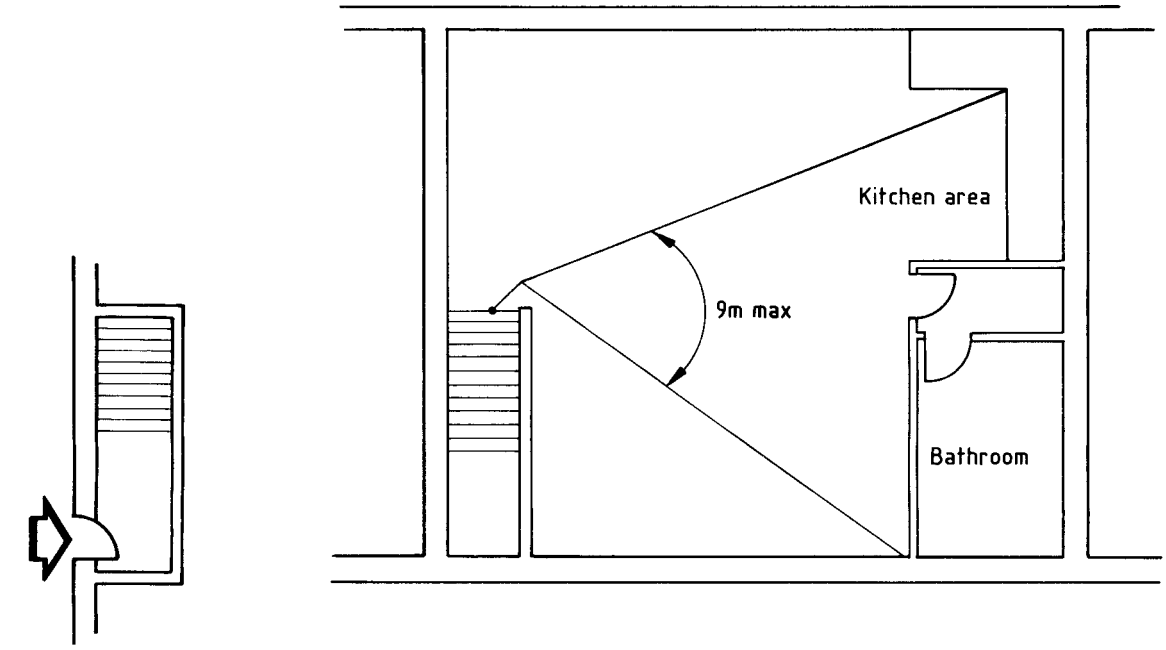
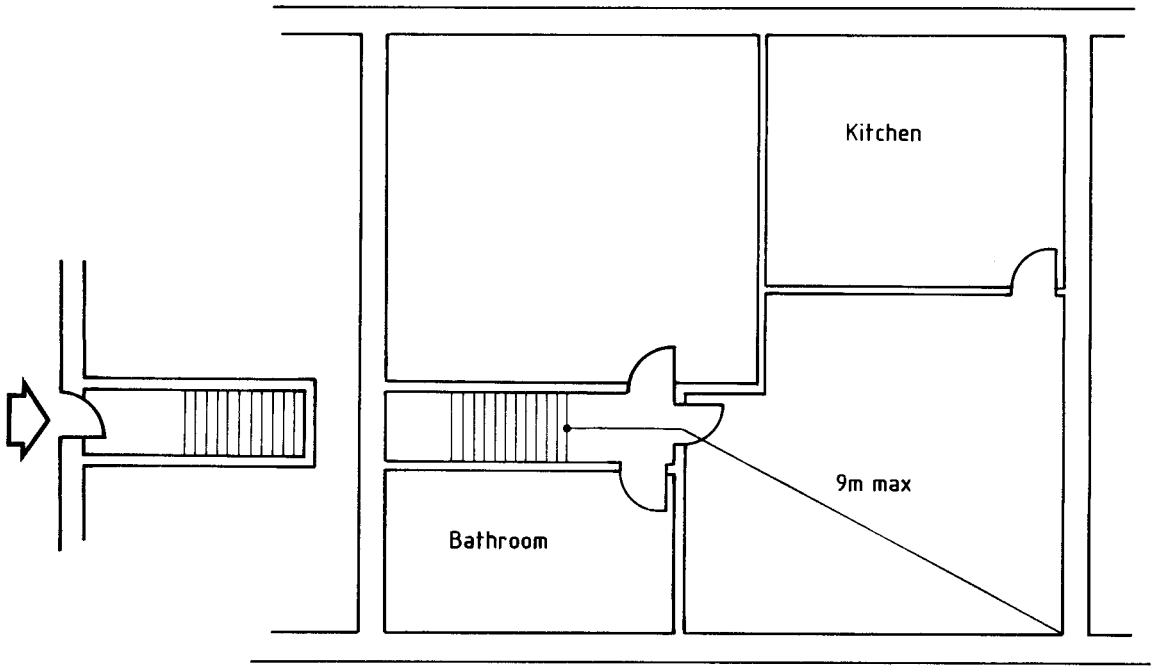


(a) Open-plan flat (bedsitter)



(b) Flat with separate habitable rooms

Key: ⇨ Entrance to dwelling

NOTE 1. The entrance door may need to be a fire door (see **18.6.2**).
NOTE 2. Compartment walls need to be fire-resisting (see **18.3.2**(b)).

Figure 8 — Flat (entered from below) with a restricted travel distance

10 Internal planning of maisonettes

10.1 Commentary

Maisonettes may occupy more than two storeys, and may be traditionally planned, with separate rooms, or may be open plan. However, irrespective of size and design, two basic considerations apply: firstly it is necessary to ensure that the internal planning of a maisonette is such that a fire anywhere in the maisonette will not trap the occupants; and secondly it is necessary to ensure that escape is possible from a maisonette in which a fire has broken out. It is essential, particularly in open-plan dwellings, that cooking facilities are so located that occupants when escaping can turn their backs to any fire in this area.

In general, maisonettes need to be provided with an alternative exit (or exits) from the floor or floors in which the dwelling entrance is not situated. The number of alternative exits and the fire separation between the areas of the maisonette are not only dependent on one another but also on whether or not rooms which may be used for sleeping are on the same level as the entrance to the maisonette. Suitable forms of alternative exit are discussed in Clause **11**.

However, these constraints are unnecessary in the case of maisonettes entered from outside the building at ground level. Similar considerations apply to maisonettes entered from a first floor podium.

10.2 Recommendations for maisonettes with an independent external entrance at ground or access level

The dwelling should comply with the appropriate recommendations in Section 2.

10.3 Recommendation for maisonettes with no storey situated more than 4.5 m above ground or access level

No maisonette should be so planned that any habitable room is an inner room unless that room is provided with a door or window complying with **11.5** for escape or rescue purposes.

10.4 Recommendation for maisonettes with one or more storeys situated more than 4.5 m above ground or access level and entered from above or below

The following recommendations are applicable.

a) No maisonette should be so planned that any habitable room is an inner room.

b) On every storey situated more than 4.5 m above ground level (other than the floor of entrance to the maisonette) either:

1) an alternative exit from each room should be provided (see Figure 9 and Figure 11); or

2) at least one alternative exit should be provided, and all habitable rooms should be entered directly from either a protected entrance hall or a protected landing (see Figure 10).

11 Alternative exits from dwellings and doors and windows for escape or rescue purposes

11.1 Commentary

Any alternative exit provided in accordance with the recommendations of Clauses **9** and **10** for the internal planning of dwellings can only be considered acceptable if it is so sited and is of such a type that the basic considerations outlined in **9.1** and **10.1** are met. It therefore follows that the internal arrangement of any dwelling having an alternative exit should allow access from all habitable rooms to either the main entrance door or the alternative exit following an outbreak of fire in that dwelling, and that fire separation is provided where necessary to safeguard the occupants who need to use the alternative exit. Similarly, it is essential for every such exit to be available at all times and for persons using them to be able to get well clear of the fire from which they are escaping. For these reasons linking balconies and pass doors between dwellings are unacceptable, as is escape via a flat roof into an adjoining building.

The recommendations for doors and windows are to enable the doorway or window opening to be used for escape by, or the rescue of, occupants of basement, ground or first floor rooms.

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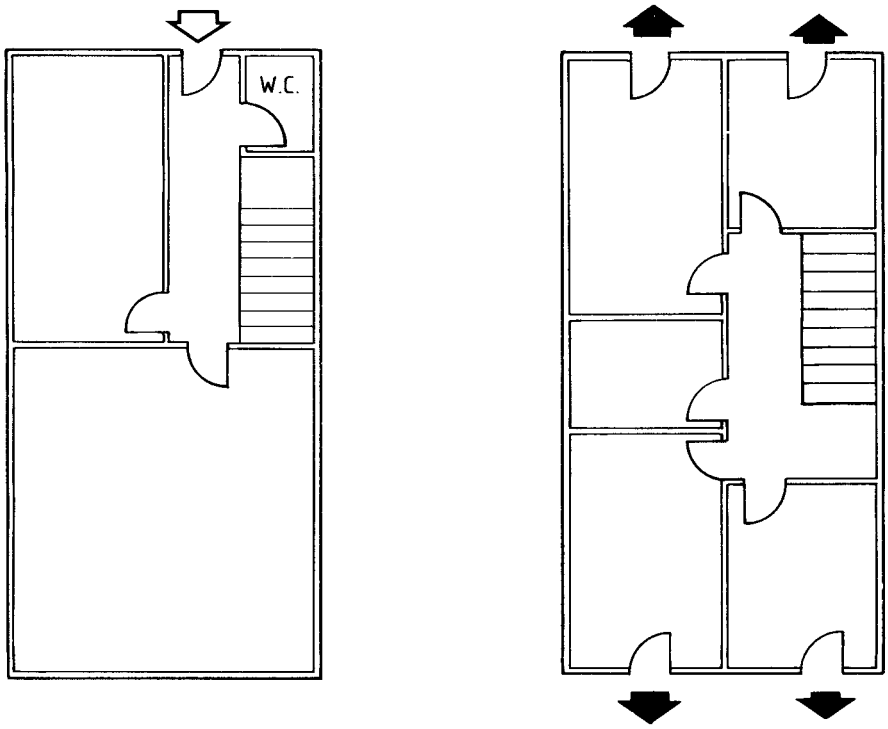


Key:

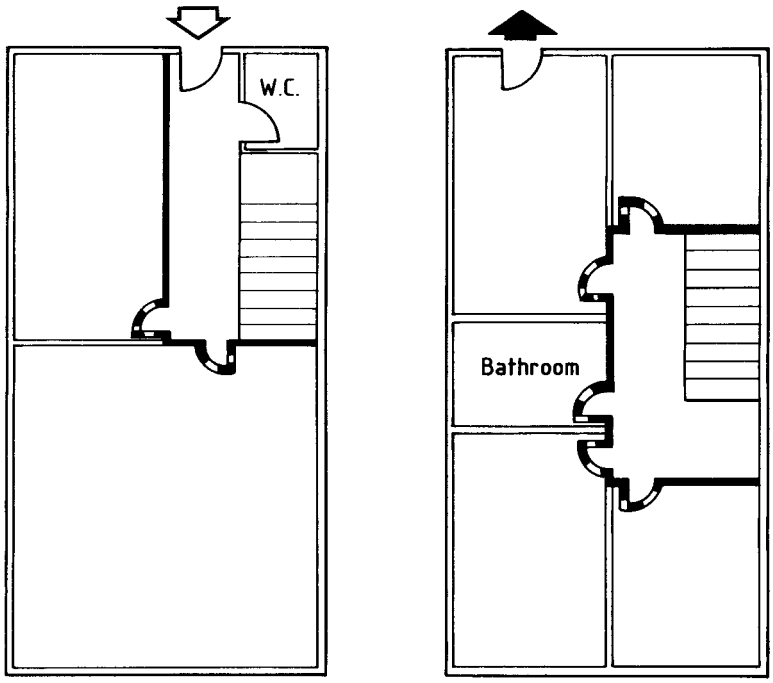
Entrance to dwelling

Alternative exit from dwelling

NOTE 1. The entrance and alternative exit doors may need to be fire doors (see **18.6.2**).

NOTE 2. Compartment walls need to be fire-resisting (see **18.3.2**(b)).

Figure 9 — Maisonette with alternative exits from each room not on the floor of entrance



Key:

Entrance to dwelling

Alternative exit from dwelling

Self-closing FD 20 fire door

30 min fire-resisting construction

NOTE 1. The entrance and alternative exit doors may need to be fire doors (see **18.6.2**).

NOTE 2. If the partitions between the bathroom and adjoining rooms have a 30 min fire resistance then the partition between the bathroom and the hall need not be fire-resisting and the bathroom door need not be a fire door.

NOTE 3. Compartment walls need to be fire-resisting (see **18.3.2**(b)).

Figure 10 — Maisonette with protected entrance hall and landing

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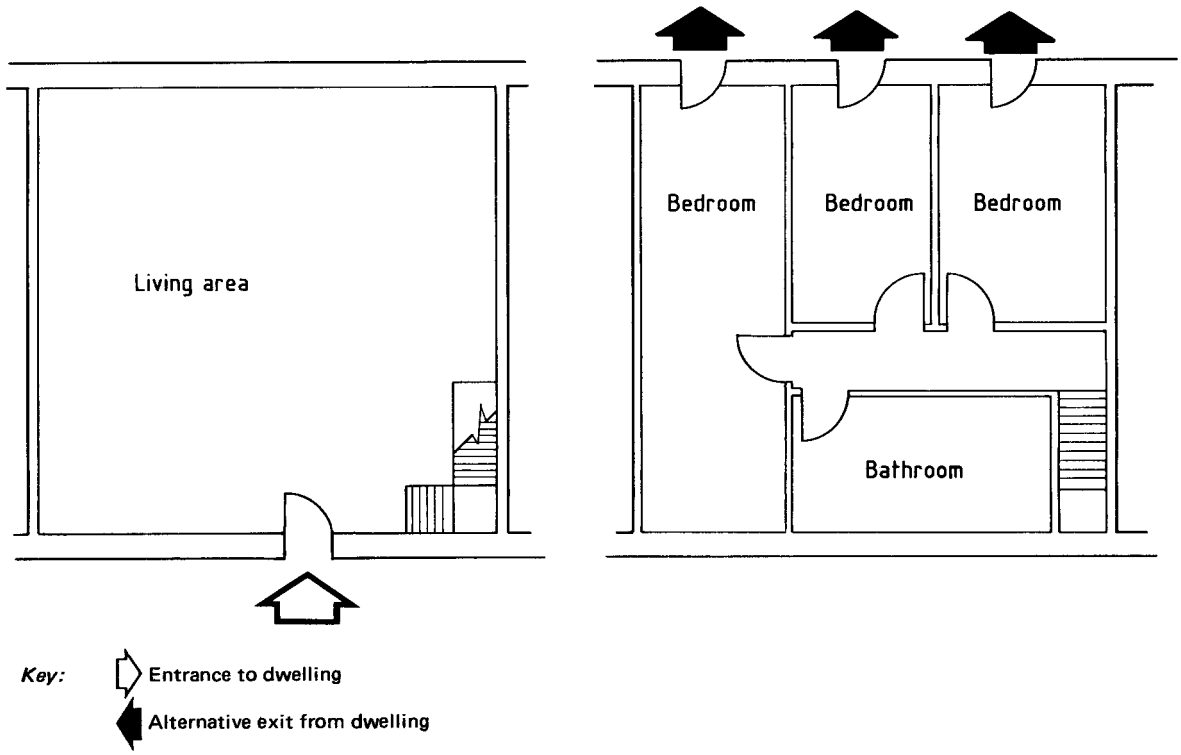

NOTE 1. The entrance and alternative exit doors may need to be fire doors (see **18.6.2**).

NOTE 2. Compartment walls need to be fire-resisting (see **18.3.2**(b)).

Figure 11 — Open-plan maisonette

11.2 Recommendations for alternative exits from flats

The following recommendations are applicable.

a) Alternative exits should be sited remote from the main entrance door to the flat.

b) Provision of alternative exits should be in accordance with the principles indicated in Figure 3 and Figure 6.

c) Alternative exits should lead to a final exit or common stair by way of:

1) a door onto an access corridor, common balcony or deck at the same level; or

2) an internal private stair leading to an access corridor, common balcony or deck at another level; or

3) a door onto an external stair; or

4) a door onto an escape route across a flat roof leading to the head of a common or external stair.

11.3 Recommendations for alternative exits from maisonettes

The following recommendations are applicable.

a) Provision of alternative exits should be in accordance with the principles indicated in Figure 9, Figure 10 and Figure 11 as appropriate.

b) Alternative exits should lead to a final exit or common stair by way of:

1) a door onto an access corridor, common balcony or deck; or

2) a stair separated by fire-resisting construction from the rest of the dwelling leading to an access corridor, common balcony or deck; or

3) a door onto an external stair or a stair separated from the rest of the dwelling by fire-resisting construction; or

4) a door onto an escape route across a flat roof leading to the head of a common or external stair.

11.4 Recommendations for escape onto a flat roof

An alternative exit may be onto a flat roof provided that the following conditions are satisfied.

a) Such a roof is part of the same building from which escape is being made.

b) The route across the roof:

1) leads to a storey exit;

2) is adequately defined and guarded with protective barriers in accordance with BS 6180.

c) Such a part of the escape route and its supporting structure is constructed as a fire-resisting floor.

d) Where an escape route is in one direction only, any ventilation outlets or other extract system, and any doors, roof lights, or windows that are not fire-resisting, should not be sited within 3 m of such a route.

11.5 Recommendations for doors and windows for escape or rescue purposes

The following recommendations are applicable.

a) A window should provide an unobstructed opening not less than 850 mm by 500 mm.

b) The bottom of any window opening should be not more than 1 100 mm above the floor of the room in which it is situated.

NOTE To provide protection against falling, building regulations will generally be satisfied if the bottom of the opening is not less than 800 mm above the floor (except for a rooflight, in which case the bottom of the opening should be not less than 600 mm above the floor).

c) Where provided for escape or rescue purposes from a room above ground level:

1) any doors (including a french window or a patio window) should lead to a balcony guarded with a protective barrier complying with BS 6180;

2) the ground beneath a window or balcony should be clear of any obstructions (such as iron railings or horizontally hung windows) and should be of a size and material suitable and safe for supporting a ladder.

d) A door or window should not face onto an internal shaft or enclosure unless:

1) escape to a place of safety is possible without re-entering the building; and

2) there is sufficient space to bring in and safely erect a suitable ladder if escape or rescue would be from a room above ground level.

12 Escape routes from dwellings with corridor or lobby approach

12.1 Commentary

In these designs, because of the risks presented to escaping occupants by the presence of smoke and heat in the internal corridor or lobby, and to afford the designer some flexibility, the following methods of securing safety should be considered.

a) The limitation of travel distance between the exit doors from the dwellings and a relatively smoke-free area, and a means of keeping the amount of smoke and other products of combustion in the internal corridor or lobby to a minimum, by providing either cross-corridor fire doors and ventilation, or pressurization.

NOTE Smoke control is covered in Clause **36**.

b) The provision of an independent alternative escape route from each dwelling either by way of a corridor at another level or an external common balcony.

Whilst maximum travel distances are given, as a general principle dwelling entrance doors should be located as close as possible to common stairs or cross-corridor fire doors.

In buildings or parts of buildings of limited height containing a limited number of dwellings (small buildings), the application of all the recommendations applicable to blocks of flats and maisonettes in general would be unreasonably onerous, and therefore alternative recommendations appropriate to the risk to the occupants of such buildings are given in **12.3**.

Additional recommendations for escape routes in sheltered housing are given in **17.3.2**.

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12.2 Recommendations

The following recommendations are applicable.

a) *Buildings not provided with a pressurization system.* Provision of escape routes should be in accordance with the principles indicated in Figure 12 and Figure 13.

b) *Buildings provided with a pressurization system.* Provision of escape routes should be in accordance with the principles indicated in Figure 12 and Figure 13 except that cross-corridor fire doors and openable or automatically opening vents may be omitted. All common stair enclosures, lobbies and corridors in the building should be pressurized (see **36.5**).

12.3 Recommendations for small buildings with a single stair

The following recommendations are applicable.

a) The height (see **2.27**) of the building or part of the building should not exceed 11 m, nor should there be more than four storeys above ground level.

b) Provision of escape routes should be in accordance with the principles indicated in Figure 14.

c) The stair should not connect to a covered car park unless the car park is provided with permanent cross-ventilation (see **36.7**).

d) The stair should not serve ancillary accommodation unless both:

1) the storey containing the ancillary accommodation does not contain any dwellings; and

2) the ancillary accommodation is separated from the stair by a ventilated protected lobby or ventilated protected corridor (see **14.6.2**).

13 Escape routes from dwellings with balcony or deck approach

13.1 Commentary

If the balconies are relatively narrow it may be assumed that in general there is little risk of them becoming smoke-logged. Therefore the only considerations necessary are to ensure that the distance to any dwelling from a fire main is acceptable for the purposes of firefighting and, in the case of single stair buildings, that adequate safeguards are provided for persons wishing to escape past the dwelling on fire.

However, where wider balconies or deck approach is adopted, their greater depth may be such that they could become smoke-logged even though the external elevation is open to the outside air. The provision of downstands at right angles to the face of the building should minimize the possibility of smoke issuing from any dwelling on fire spreading laterally along the deck. This would also reduce the chances of smoke-logging on the decks above.

Unacceptable risks to the occupants of dwellings with wider balconies or deck approach will also arise if opportunity is taken to use this greater depth to erect “external” stores or other fire risks.

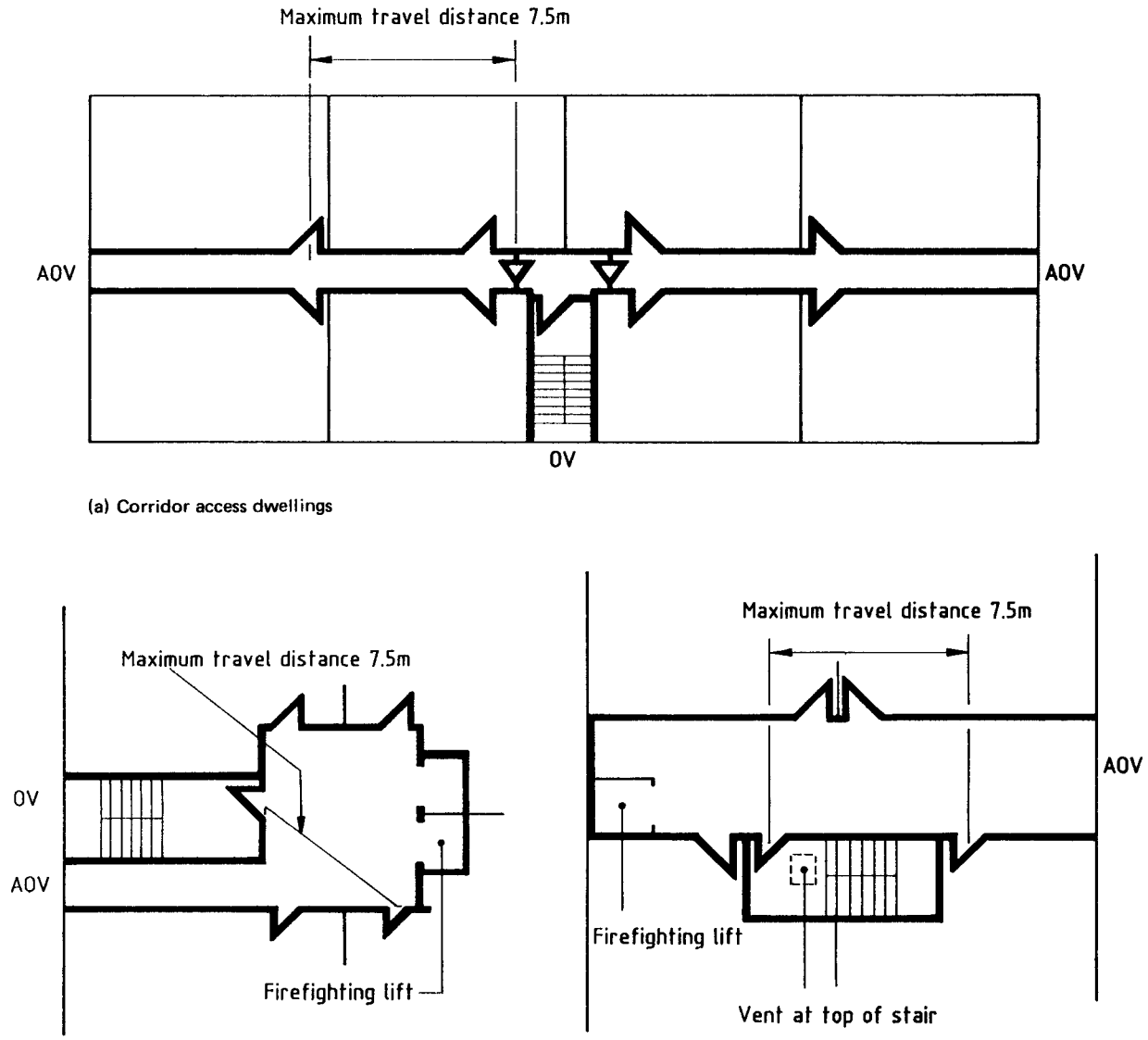
13.2 Recommendations

The following recommendations are applicable.

a) Provision of escape routes should be in accordance with the principles indicated in Figure 15.

b) No store or other fire risk should be erected externally on the balcony or deck.

c) The soffit above a deck or a balcony with a width not less than 2 m should be designed with downstands placed at 90° to the face of the building (on the line of separation between individual dwellings). The down-stand should project 0.3 m to 0.6 m below any other beam or downstand parallel to the face of the building.



(a) Corridor access dwellings

(b) Tower block dwellings (stair adjacent to an external wall)

(c) Tower block dwellings (internal stair)

Key: AOV Automatically opening vent (1.5 m^2 minimum)

OV Openable vent for fire service use (1.0 m^2 minimum)

Fire-resisting construction

Self-closing FD 20S fire door

Self-closing FD 30S fire door

NOTE 1. Where all dwellings on a storey have independent alternative means of escape the maximum travel distance may be increased to 30 m.

NOTE 2. Where a firefighting lift is required it should be sited not more than 7.5 m from the door to the stair.

NOTE 3. The OVs to the stairway may be replaced by an openable vent over the stair.

Figure 12 — Common escape routes in single stair buildings more than 11 m in height

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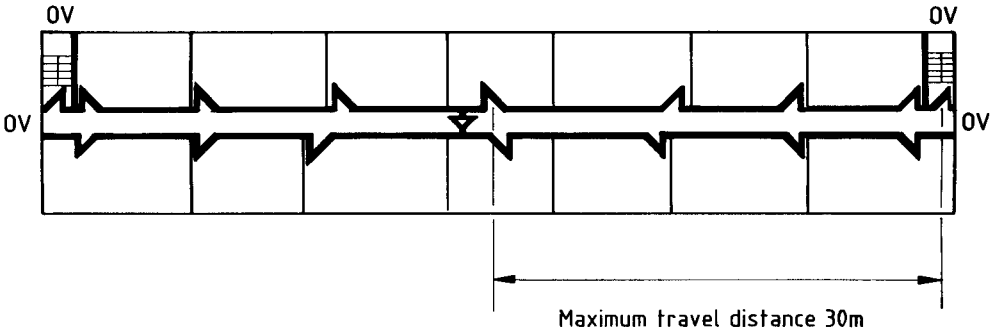
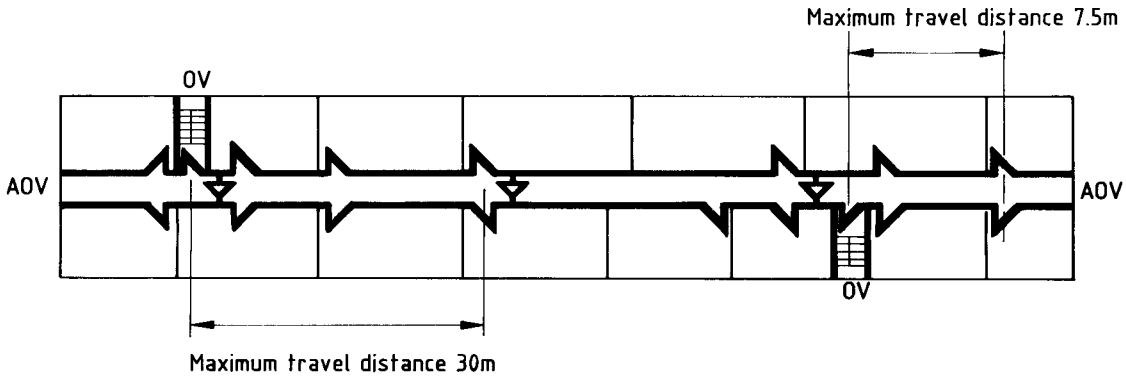
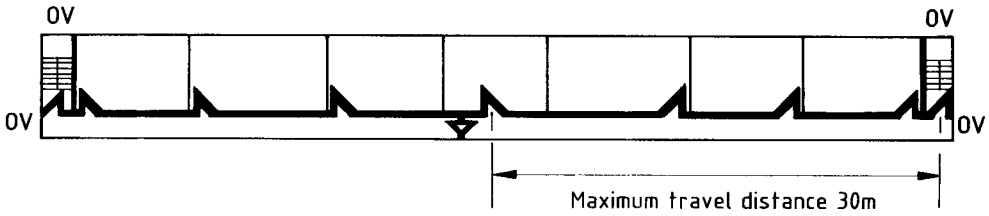


(a) Corridor access dwellings (no dead ends)



NOTE 1. The central fire door may be omitted where the maximum travel distance does not exceed 15 m.

(b) Corridor access dwellings with dead ends



(c) Corridor access with dwellings on one side only

Key: AOV Automatically opening vent (1.5 m^2 minimum)

OV Openable vent for fire service use (1.0 m^2 minimum)

Fire-resisting construction

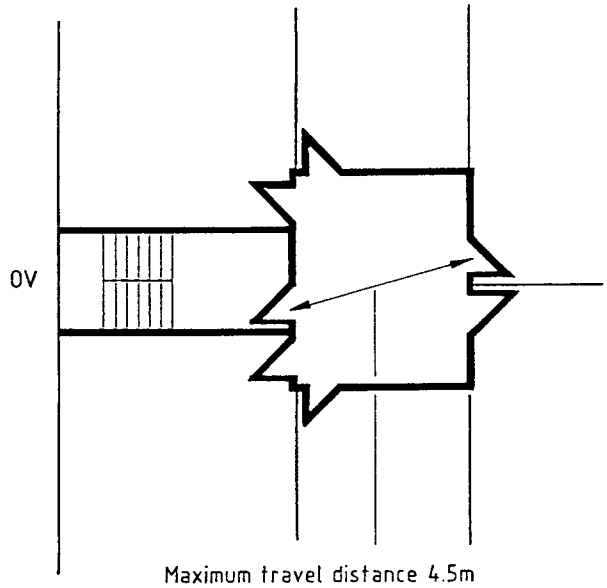
Self-closing FD 20S fire door

Self-closing FD 30S fire door

NOTE 2. Where all dwellings on a storey have independent alternative means of escape there are no limitations on travel distance. However, all parts of the building need to be within 60 m of a fire main, measured along a line on which hose can be laid.

NOTE 3. The OVs to a stairway may be replaced by an openable vent over the stair.

Figure 13 — Common escape routes in multi-stair buildings



NOTE 1. If the lobby is provided with an AOV (1.5 m^2 minimum) the maximum travel distance may be increased to 7.5 m.

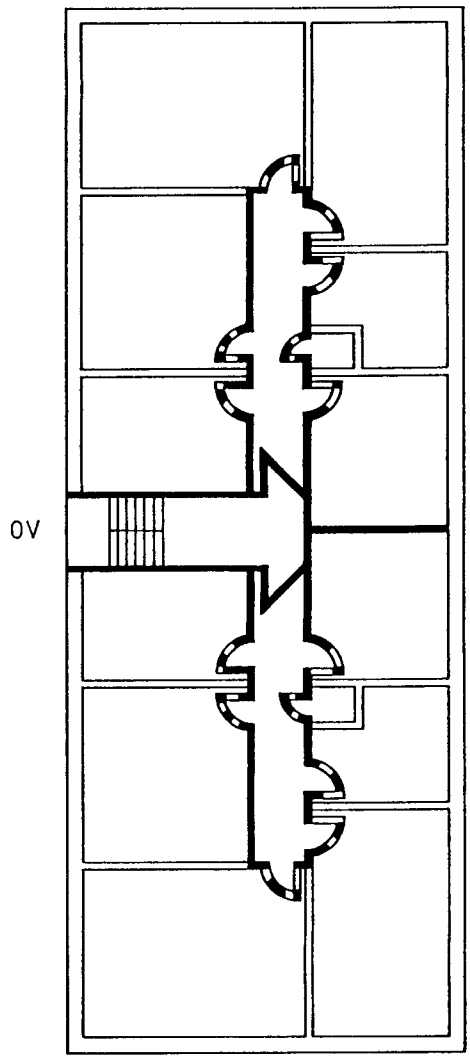
(a) Small single stair building

Key: OV Openable vent for fire service use (1.0 m^2 min.)

Fire-resisting construction

Self-closing FD 30S fire door

Self-closing FD 20 fire door



(b) Small building with not more than two dwellings per storey

NOTE 2. The OVs to the stair may be replaced by an openable vent over the stair.

Figure 14 — Common escape routes in small single stair buildings

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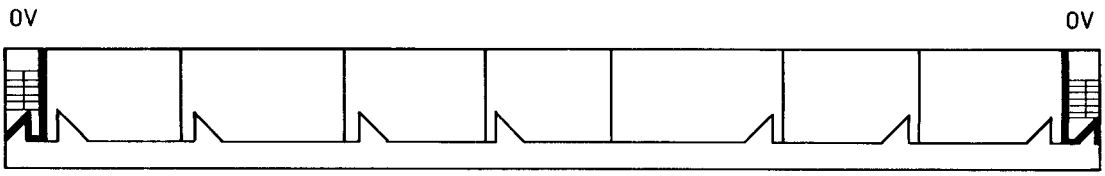
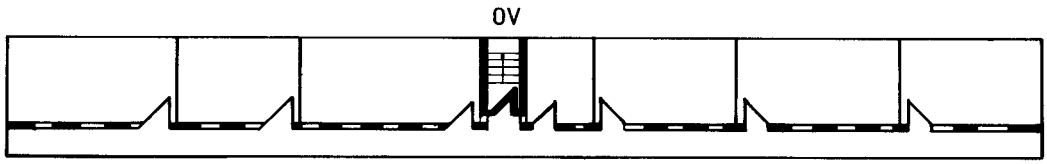
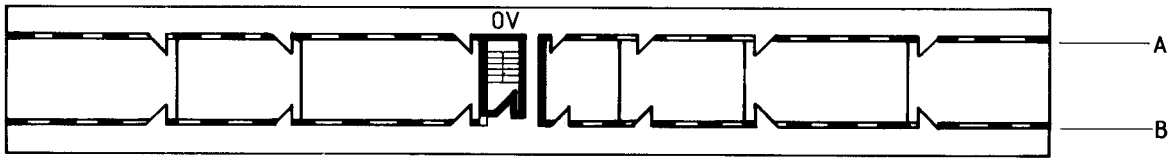


(a) Multi-stair building



(b) Single stair building



NOTE 1. Either external enclosure A or external enclosure B should be fire resisting.

(c) Single stair building with an alternative exit from every dwelling

Key: OV Openable vent for fire service use (1.0 m^2 minimum)

Fire-resisting construction

Fire-resisting construction up to a height of 1.1 m above deck level

Self-closing FD 30S fire door

NOTE 2. All doors breaching the 1.1 m high fire-resisting separation should be self-closing FD 20 fire doors.

NOTE 3. Although there are no limitations on travel distance, all parts of the building need to be within 60 m of a fire main, measured along a line on which hose can be laid.

NOTE 4. The OVs to a stairway may be replaced by an openable vent over the stair.

Figure 15 — Common escape routes in balcony/deck approach buildings

14 Stairs and final exits

14.1 Number and siting of common stairs

14.1.1 ***Commentary***

In buildings or parts of buildings occupied for non-residential purposes a single common stair would be considered acceptable only in very limited circumstances. However, in buildings comprising flats and/or maisonettes, because of the degree of compartmentation provided and the special provisions made for controlling the spread of smoke within common horizontal escape routes, whether or not a single common stair will suffice would depend entirely on any limitations imposed in respect of travel distances or, for balcony or deck approach dwellings, firefighting purposes. Where two or more common stairs are provided they should be so located that they are remote from each other.

14.1.2 ***Recommendations***

The following recommendations are applicable.

a) There should be not less than one common stair available from each storey affording access to dwellings.

b) Additional common stairs should be provided as necessary to meet requirements for travel distance or, for balcony or deck approach dwellings, firefighting purposes (see Figure 15), and should be sited such that they afford effective alternative directions of travel from any dwelling served by those stairs other than accepted dead ends [see Figure 13(b)].

14.2 Width of common stairs

14.2.1 ***Commentary***

In buildings or parts of buildings occupied for non-residential purposes, the minimum stair width is directly related to the number of persons occupying the building or storeys served. However, in buildings comprising flats and/or maisonettes, because of the degree of compartmentation and the smoke control measures, the one stair width recommended ought to accommodate all persons likely to need to use the stair(s).

14.2.2 ***Recommendation***

The unobstructed width (measured between the walls and/or balustrades) of each common stair should not be less than 1.0 m; common stairs which are firefighting stairs should have an unobstructed width (measured between the walls and/or balustrades) of 1.1 m. The width should be maintained clear for a vertical distance of 2.0 m, measured from the floor level or pitch line stringers, with the following exceptions:

a) strings, each intruding into the stair not more than 30 mm;

b) handrails, each intruding into the stair not more than 100 mm.

14.3 Enclosure of common stairs

14.3.1 ***Commentary***

The fire-resisting enclosure of a common stair is provided to prevent:

a) smoke and heat from entering the stairway and rendering it impassable for escape purposes;

b) fire spreading from one storey to another.

Where there is more than one common stair (see **14.1.2**), it is important to arrange any access to an alternative common stair so that persons need not pass through one stairway to reach another in the event of a failure in a fire of the enclosure to a common stair. It is also important to ensure that there are no fire risks within a common stairway.

In buildings of height (see **2.27**) exceeding 18 m, one or more common stairs will need to be designed as firefighting stairs (see **35.2**).

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14.3.2 ***Recommendations for common stairs other than firefighting stairs***

The following recommendations are applicable.

a) No store should open directly into a common stair.

NOTE Engineering services such as gas, electricity and refuse disposal should comply with the recommendations given in Section 6.

b) If a common stair projects beyond, or is recessed from, the external enclosures to a building:

1) the distance between any opening in the external enclosure to the building and any opening in the enclosure to the stairway should be not less than 1.8 m;

2) the enclosures within that distance and up to 9 m vertically below should be of fire-resisting construction that may have fixed fire-resisting glazed areas.

c) Where two common stairs adjoin they should be separated by imperforate construction, i.e. no openings, doors, etc. are allowed in the separating elements common to both stairway enclosures.

d) If any storey of a building (or part) is required to have more than one escape route, common stairs should be sited so that access to alternative common stairs may be obtained from any point on that storey without passing through any other such stairway.

e) If a common stair forms part of the only escape route from a dwelling it should not be connected to any ancillary accommodation on the same storey as that dwelling.

14.4 Basement stairs

14.4.1 ***Commentary***

Special considerations apply to common stairs in basements because areas below ground level, especially if used for storage, are more likely to become completely filled with smoke and heat from a fire than are the ground and upper storeys. There is therefore a greater risk that a common stair in a basement will become obstructed by smoke and heat. For this reason it is preferable that all common stairs to basements be entered at ground level only from the open air and from such positions that smoke from any basement fire will not obstruct any exit serving the ground and upper storeys of the building. However, in buildings having two or more common stairs available for escape from the upper storeys, no objection is seen to one or more common stairs continuing down to the basement provided each such stairway is adequately protected from ingress of smoke from the basement and at least one stair serving the upper floors of the building (or part) is terminated at ground level.

14.4.2 ***Recommendations***

The following recommendations are applicable.

a) If a common stair forms part of the only escape route from an upper storey of a building (or part) it should not be continued down to serve any basement storey unless in a small single stair building (see **12.3**), in which case it should be separated at ground or access level by fire-resisting construction.

b) If there is more than one common stair from an upper storey of a building (or part), at least one such stair serving the upper storeys of the building (or part) should be terminated at ground level; any other stair may connect with the basement storey(s) provided that it is separated from each basement level by a protected lobby (see **14.6**).

14.5 Stairs within mixed user developments

14.5.1 ***Commentary***

Special considerations apply to mixed user buildings for the reasons outlined in **3.3**e). Therefore, as a general rule, any stair serving dwellings should not communicate with any part of the building occupied for different purposes. However, for practical reasons flats or maisonettes which are ancillary to the main use of a building (e.g. for use by a caretaker) may communicate with the remainder of that building provided adequate safeguards exist.

14.5.2 ***Recommendations***

The following recommendations are applicable.

a) In buildings with not more than four storeys above ground or access level, stairs may serve both dwellings and non-residential occupancies provided they are separated from each occupancy by protected lobbies at all levels.

b) In buildings with more than four storeys above ground or access level:

1) all stairs serving flats or maisonettes which are not ancillary to the main use of the building should not communicate with any other part of that building;

2) any stair serving a flat or maisonette which is ancillary to the main use of the building may communicate with the other parts of that building only if:

i) the stair is separated from any such lower storeys by a protected lobby (see **14.6**); and

ii) an independent alternative escape route is provided from the flat or maisonette; and

iii) where the main building is fitted with an automatic fire detection and alarm system (see Clause **31**) the system also covers the dwelling.

14.6 Access lobbies and corridors to protected stairways

14.6.1 ***Commentary***

Lobby protection to protected stairways is necessary to safeguard stairs serving dwellings which also connect with enclosed car parks, boiler rooms and transformer chambers, etc.

Still greater protection is necessary in connection with firefighting stairs provided in buildings having storeys beyond the reach of external firefighting equipment (see **35.2**).

14.6.2 ***Recommendations***

The following recommendations are applicable.

a) If a protected stairway serves a dwelling and ancillary accommodation it should be approached from the ancillary accommodation only by way of a protected lobby or a protected corridor.

b) If a stair in a mixed user building serves both dwellings and non-residential accommodation, then a protected lobby should be provided between each occupancy and the stairway at all levels.

c) If the stair provides access to an enclosed car park, there should be a ventilated protected lobby (see **36.6**) at every car park access level.

d) If the stair directly serves an area of higher fire risk (see **19.2**) there should be a ventilated protected lobby or ventilated protected corridor (see **36.6**) at that level.

e) If the stair connects the ground or upper storeys with a basement storey or storeys, or serves only basement storeys, there should be a protected lobby or protected corridor at every basement level.

f) In a small single stair building (see **12.3**) any protected lobby or protected corridor separating ancillary accommodation from the stair should be ventilated (see **36.6**).

14.7 External stairs

14.7.1 ***Commentary***

External escape stairs, whilst not desirable, may, in exceptional circumstances, be provided for small buildings or from storeys near to ground level or a roof or podium with its own escape route.

It is necessary to ensure that their use at the time of a fire cannot be prejudiced by smoke and flames from nearby doors and windows.

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14.7.2 ***Recommendations***

The following recommendations are applicable.

a) External stairs should not form part of an escape route except in the case of:

1) flats or maisonettes with an exit to a storey not more than 6 m above ground level;

2) flats or maisonettes with an exit to a storey not more than 6 m above a roof or podium which is itself served by an independent protected escape route.

b) Any wall or portion (other than more than 1.1 m above the top floor level of a stair not being a basement stair) within 1.8 m of, or within 9 m vertically below, any external escape stair should be of fire-resisting construction that may have fixed fire-resisting glazed areas, and the doors to the stair (other than the door at the top floor level of a stair serving storeys above ground level) should be fire-resisting and self-closing (see Figure 16).

c) Where the escape route from the stair is in one direction only, any ventilation outlets or extract system, and any doors or windows that are not fire-resisting, should not be sited within 3 m of the route.

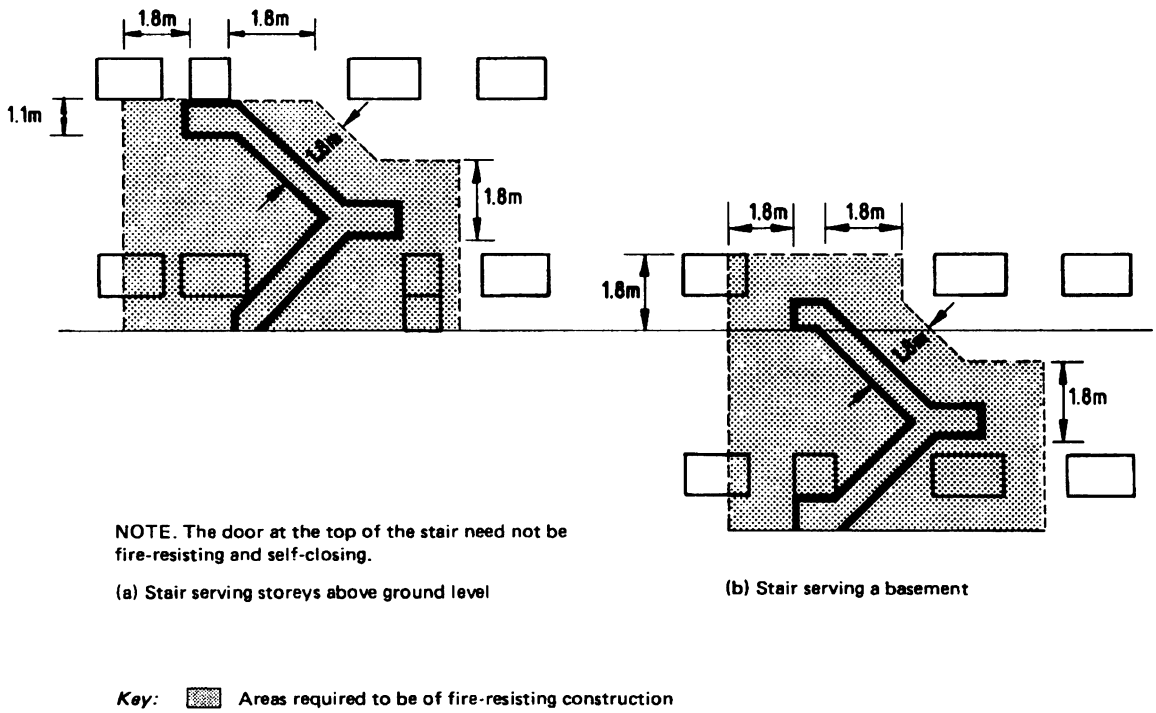

Figure 16 — Fire resistance of areas adjacent to external stairs

14.8 Discharge from common stairs and final exits

14.8.1 ***Commentary***

All occupants of the building using the common stairs to reach safety in the open air should be assured of the same degree of protection from the effects of smoke and heat in this part of the escape route as that provided in the other parts. In achieving safety in this part of an escape route the following considerations apply.

The safest discharge arrangement is for the stair or final exit to discharge directly to the street at ground level.

An arrangement by which two stairs terminate in the same enclosure at final exit level should not be employed because an outbreak of fire leading to penetration of the enclosure at that level would render both stairs simultaneously unusable.

If a tower block rises above a podium, it is preferable that the escape stair(s) from the tower descend(s) through the podium to ground level; any firefighting stair should certainly do so. If other stairs cannot be so arranged and occupants are required to use the stairs of the podium there should be adequate protection of the escape route connecting the two stairs such that the occupants of the building can be assured of safety until street level is reached. Similarly, any portion of the escape route that may lead (for example) across a concourse, a pedestrian walkway or roof should be clearly defined and protected.

In general, upper and ground floor plans should be developed together since a satisfactory upper floor plan may be unsuitable at ground floor level, and vice versa.

14.8.2 ***Recommendations***

The following recommendations are applicable.

a) Where the exit passageways from two common stairs adjoin they should be separated by imperforate construction, i.e. no openings, doors, etc. are allowed in the separating element common to both passageways.

b) Any final exit should be immediately apparent to any person using a stairway that serves storeys both above and below the point of final exit.

c) Final exits should be so sited that they are clear of any risk from fire or smoke.

d) Transformer chambers, boiler rooms, refuse storage areas and similar risks should not have any openings that would prejudice the means of escape from residential accommodation.

15 Ducted warm air heating systems

15.1 Commentary

With this form of heating, precautions are necessary within any dwelling having a protected entrance hall or landing to avoid any risk that such a system (irrespective of fuel) would permit the spread of smoke or fire (whether by forced convection, natural convection or fire-induced convection) from rooms to the protected escape route from the dwelling.

15.2 Recommendations

The following recommendations are applicable in the case of every flat or maisonette provided with a protected entrance hall or landing.

a) Transfer grilles should not be fitted in any wall, floor or ceiling enclosing the protected entrance hall of a dwelling or protected stairway and landing of a maisonette.

b) All ductwork passing through the enclosure to any such protected entrance hall or protected stairway and landing should be so fitted that all joints between the ductwork and the enclosure are fire-stopped.

c) Where ductwork is used to convey warm air into the protected entrance hall of the dwelling or protected stairway and landing within a maisonette through the enclosure of the protected hall or stairway, the return air from the protected hall or stairway shall be ducted back to the heater.

d) Warm air and return grilles or registers should be positioned at a height not exceeding 450 mm above floor level.

e) A room thermostat should be mounted at a height between 1 370 mm and 1 830 mm in an area from which air is drawn directly to the heating unit, and its maximum setting should not exceed 27 °C.

16 Fire safety signs

16.1 Commentary

The fire authority should be consulted with regard to the siting and positioning of fire safety signs so that the occupants of a building can clearly and readily see where the exits are and where to go in an emergency at any time.

16.2 Recommendations

Exits, other than those from dwellings or in normal use for egress, should be clearly marked with the appropriate sign complying with BS 5499-1.

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17 Sheltered housing

17.1 General

Sheltered housing is a specialized form of development consisting of self-contained dwellings, with assistance available at all times and usually includes amenities common to all residents.

NOTE Guidance on suitable social alarm systems is given in BS 6804.

Designers need to consider the limitations of the occupants and to make suitable allowances in their schemes, in particular, reference should be made to BS 4467 and BS 8300 where appropriate.

17.2 Internal planning

Recommendations additional to those given in Clauses **9** and **10** are not considered necessary, but the following points should be taken into consideration.

Rather than provide protected entrance halls provided with fire doors that can be seen as an obstacle, resulting in their being wedged open, thus negating the protection of the protected lobby, it is far more desirable to limit the distance of travel to the dwelling entrance door, or for an alternative exit to be provided, particularly as each dwelling needs to be provided with facilities for fire detection and alarm and hence the affected resident would have a warning of a fire situation within their dwelling. The provision of alternative exits is particularly suitable for ground storey dwellings.

17.3 Escape routes from dwellings

17.3.1 *Commentary*

In addition to the recommendations of Clause **12** (balcony or deck access dwellings are not usually considered suitable for sheltered housing), the distance of travel between a dwelling entrance door and a fire door affording access into a stairway, protected lobby or subdividing a corridor needs to be limited so that most occupants are capable of making a safe escape from their dwellings without outside assistance, as it cannot be assumed that a warden would be in residence or would be able to render assistance. An elderly or disabled person should not be confronted by thick smoke nor be required to travel far in a smoke-filled corridor to a place of safety. As sheltered housing will normally consist of corridor access dwellings, careful consideration ought to be given to the capabilities of the average resident when considering smoke control; in most circumstances the fitting to cross-corridor fire doors of hold-open devices that will release in a fire will enable free circulation of residents whilst still providing satisfactory smoke control.

Elderly and disabled people often find going up and down stairs particularly difficult. The provision of intermediate landings and of handrails to both sides of stairs recognizes this; lengthy flights of stairs should also be avoided. If a lift is provided, consideration should be given to the installation of a lift that can be used as an evacuation lift in case of fire.

17.3.2 *Recommendations*

The following recommendations are applicable.

a) Common escape routes should be so planned that

1) the recommendations of Clause **12** are met; and

2) the travel distance from each dwelling entrance door to a fire door giving access into a protected stairway or protected lobby or subdividing a corridor does not exceed 7.5 m unless that dwelling is provided with an independent alternative escape route.

b) Wherever possible intermediate landings should be provided.

c) Handrails should be fixed to both sides of stairs and intermediate landings.

d) Any lift provided for means of escape should comply with the appropriate recommendations of BS 5588-8.

17.4 Communal areas

17.4.1 *Commentary*

Areas such as residents' lounges, open-plan entrance lounge areas, guest suites and common access routes provided with furniture (see Figure 17) are higher fire risk situations and care should be taken to ensure that any fire source is restricted as far as reasonably possible. Soft furnishings are the main area of concern (see BS 5588-12).

In guest suites the bed and bedding also need to be chosen so as to minimize any fire risk.

It is also necessary to provide additional exits for escape purposes in all but the smallest communal areas. Recommendations for the location of communal areas, the provision of escape routes and the structural fire protection of areas adjacent to communal areas are given in **19.1.2** and Table 2.

17.4.2 *Recommendations*

The following recommendations are applicable.

a) At least one storey exit from each ground storey communal area should be a final exit.

b) Furniture may be provided in common corridors only if:

1) the section of corridor containing furniture is separated from the remainder of the corridor by fire-resisting construction;

2) the area of the section of corridor containing furniture does not exceed 10 m^2;

3) the section of corridor containing furniture is not a dead end;

4) the width of the section of corridor containing furniture is not reduced to less than 1.0 m by the furniture;

5) no dwelling door opens into that section.

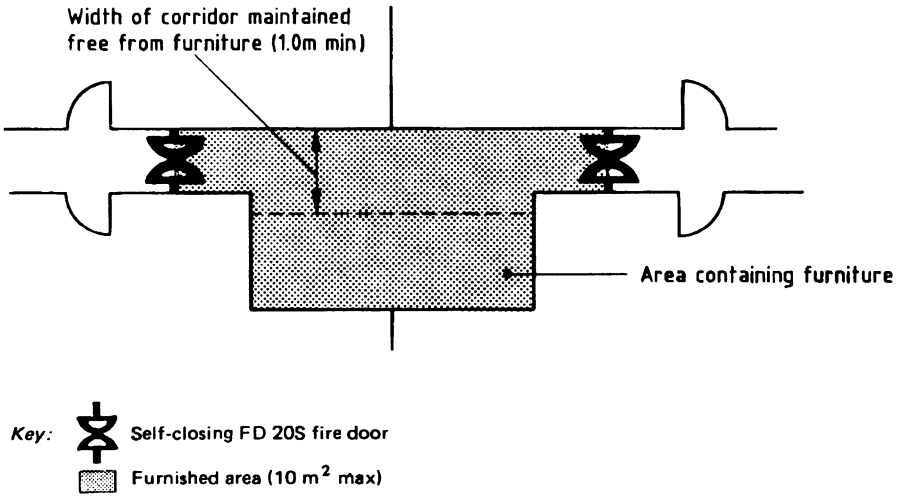

Figure 17 — Furnished areas in sheltered housing corridors

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Section 4. Construction

18 Construction

18.1 General

The recommendations in Section 2 and Section 3 are made on the assumption that the provisions for structural fire protection of any building to which this code applies comply with the appropriate building regulations. Structural fire protection embraces the following matters, but the actual requirements of some of these depend on the size of the building and its relation to the site boundary and to other buildings on the same site:

a) fire resistance of structural elements;

b) subdivision of the building into compartments;

c) protection of all shafts connecting different compartments;

d) provision of cavity barriers and fire stops;

e) restriction of spread-of-flame on surfaces of walls and ceilings;

f) construction of stairways;

g) construction of roofs;

h) construction of external walls.

The provision of structural fire protection is intended to ensure that the building will not collapse prematurely in fire, that occupants not at risk may safely remain in their dwellings, and that the means of escape will remain unaffected by fire for long enough to ensure that the escape of the occupants can take place without undue risk. It will not, however, necessarily avoid the material loss of property.

18.2 Fire resistance

18.2.1 *Commentary*

Elements of structure (columns, floors, walls, etc.) may not inherently possess sufficient fire resistance. A variety of methods of additional fire protection is available in the form of protective coverings, casings or membranes, but designers should consider the risk of mechanical or other damage when selecting methods and materials, because in some cases such damage can easily reduce or destroy the fire resistance of the element, with very serious risks as a result.

For the purposes of complying with the recommendations for means of escape in case of fire, a half-hour period of fire resistance is generally considered adequate. However, increased periods of fire resistance may be necessary to comply with building regulations for structural fire protection or to ensure adequate safety for firefighting.

Satisfactory performance of fire resistance of structural elements is ascertained by compliance with one of the following:

a) specifications tested, or assessed, under the appropriate part of BS 476[1)];

NOTE Requirements made in connection with statutory provisions may still refer to BS 476-8 although it has been superseded by BS 476-20, BS 476-21, BS 476-22 and BS 476-23, with the tests relevant to loadbearing elements published in Part 21, and those for non-loadbearing elements in Part 22. The criterion of "stability" has been replaced by the criterion of "loadbearing capacity". In line with international practice, non-loadbering elements tested to BS 476-22 are assessed only for integrity and insulation. Brief details of these tests are given in PD 6520.

b) appropriate British Standard specifications or codes of practice;

c) specifications referred to under building legislation.

18.2.2 *Recommendations*

Fire resistance, where recommended in this code, should be taken (in the absence of any recommendation to the contrary) as requiring not less than 30 min fire resistance, and implies the following:

a) for loadbearing walls, equal compliance for loadbearing capacity, integrity and insulation from either side;

b) for non-loadbearing walls and partitions, equal compliance for integrity and insulation from either side;

[1)] Although BS 476-8 was superseded in 1987, specifications tested to Part 8 before 1 January 1988 are acceptable for the purposes of this code.

c) for glazed elements, equal compliance for the appropriate criteria from either side (see **18.5.2**);

d) for doors, compliance for integrity from either side except in the case of doors to lift wells where performance is in respect of exposure of the landing side only.

e) for floors, equal compliance for loadbearing capacity, integrity and insulation with respect to exposure of the underside only.

18.3 Compartmentation

18.3.1 *Commentary*

A basic concept in the fire protection of dwellings is the provision of structural fire barriers between individual dwellings, and between dwellings and other parts of the building such as common escape routes and ancillary accommodation. By the incorporation of a satisfactory standard of fire separation between the dwellings and these other areas, the likelihood of a fire significantly affecting a dwelling other than the one in which the fire originates, and the consequent need to evacuate the occupants of other dwellings, is low. Nevertheless, the possibility of occupants needing to leave their dwellings has to be provided for.

18.3.2 *Recommendation*

The following should be constructed with a fire resistance of not less than 60 min:

a) in houses, any wall separating one dwelling from another dwelling or separating the dwelling from accommodation that does not form part of the dwelling;

b) in flats and maisonettes situated more than 4.5 m above ground or access level, any floor (unless it is within a maisonette), and any wall separating a flat or maisonette from another part of the building;

c) any wall enclosing a refuse storage chamber.

18.4 Vertical shafts for lifts, hoists, services, etc.

18.4.1 *Commentary*

The penetration of fire-resisting floors by services and vertical shafts can prejudice the safety of occupants and create points of weakness in the compartmentation of the building. All such services and shafts where connecting different compartments have to comply with the provisions of building regulations.

18.4.2 *Recommendations*

The following recommendations are applicable.

a) Lift wells (other than within a protected stairway) should be enclosed throughout their height with fire-resisting construction.

b) Service shafts and other vertical ducts should be enclosed throughout their height with fire-resisting construction. Service ducts should comply with BS 8313 and ventilation and air conditioning duct-work should comply with BS 5588-9.

18.5 Glazed elements

NOTE The recommendations in BS 6262 should also be followed. These recommendations may impose further restrictions on the position, size and composition of glazed elements.

18.5.1 *Commentary*

Partitions, doors and windows containing traditional annealed wired glass based on soda-lime-silica, although possibly able to satisfy the integrity requirements of BS 476-22 for periods of up to 90 min, nevertheless permit local high heat transmission and radiation through the glass and so are unable to satisfy the insulation requirement for more than a few minutes. Such heat transmission and radiation can constitute a hazard to people escaping nearby and could ignite adjacent combustible materials. Unwired "glass" products able to satisfy the requirements for integrity are available, and some products provide "insulation" for at least 30 min.

NOTE PD 6512-3 gives advice and information on the fire performance of glazed elements in buildings.

The type of glazed element permitted in a fire-resisting construction depends on whether either:

a) the glazed element should afford the same protection as the remainder of the enclosure in which it is situated; or

b) it is only necessary for the glazed element to afford protection against the passage of flames and hot gases.

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18.5.2 *Recommendations*

The following recommendations are applicable.

a) Glazed elements that are fire-resisting in terms of integrity and insulation can be used without restriction.

b) Glazed elements that are fire-resisting in terms of integrity only:

1) in the case of houses, can be used in fire-resisting screens [see Figure 2(a)] and in door panels and fanlights;

2) in the case of buildings containing flats or maisonettes, should comply with the limitations given in Table 1 appropriate to their position.

Table 1 — Limitations on non-insulating fire-resisting glazed elements installed in buildings containing flats or maisonettes

Position of glazed element	Maximum total glazed area in:	
	fire-resisting walls[a]	any leaf of a fire door[b]
1. Part of the enclosure of a protected entrance hall or protected landing within a flat or maisonette	In fixed fanlights only	Unlimited above 1.1 m in height
2. Between a flat or maisonette and a protected lobby, a common corridor or a protected stairway	Nil	Nil
3. Between a protected lobby or common corridor and a common stair	Unlimited above 0.1 m in height	Unlimited above 0.1 m in height
4. Subdividing corridors	Unlimited above 0.1 m in height	Unlimited above 0.1 m in height
5. Between a protected lobby or an internal common corridor and a communal lounge, a common amenity area or a low voltage or extra-low voltage service installation room	Unlimited above 1.1 m in height	Unlimited above 1.1 m in height
6. Between a common stair and ancillary accommodation	Nil	Nil
7. Between an escape route and a higher fire risk area of ancillary accommodation	Nil	Nil
8. Between a dwelling and an open access balcony with escape in one direction only	Unlimited above 1.1 m in height	Unlimited above 1.1 m in height

[a] The size of individual panes of glass making up the permitted total glazed area should be limited to sizes that have been satisfactorily demonstrated to comply with the integrity criterion for an appropriate duration under test. Similarly, any mullions or transoms, especially between adjacent glazed elements, should also be proven.

[b] The suitability of any door with respect to incorporating fire-resisting glass should be established before glazing. Moreover, not all doors can be glazed without affecting the integrity of the door assembly.

18.6 Fire doors

NOTE The term "fire door" includes both the door frame and the door leaf or leaves.

18.6.1 *Commentary*

Fire doors are one of the most important links in the chain of fire safety precautions, and care in their selection to ensure that they are adequate for their purpose cannot be over-emphasized. The failure of doors under fire conditions usually occurs either at the gap between the door and the frame, or at one or more of the points where ironmongery is fixed (particularly at the hinges or lock positions), or, in the case of glazed doors, at the line of the junction between the glazed area and the rest of the door. For this and other reasons it is particularly important to ensure that doors delivered on site comply precisely, in dimensions and workmanship, with the manufacturer's specification for the appropriate fire resistance test report. Doors should also be hung to ensure a good fit to the frame when closed.

The ability of fire doors to perform their designed function will depend upon their being fully closed at the time of fire; they are, therefore, normally required to be fitted with self-closing devices. However, closers ought not to have significantly more force than is necessary to close (and latch if appropriate) the door effectively; latches should be selected and fitted so as not to require an unreasonable closing force. Where a closed door would cause problems to the normal usage of the building, and therefore possibly become wedged or otherwise held open or have the closer disconnected, electromagnetic (or similar) "hold-open" systems may be considered for use except in certain situations. However, because blocks of dwellings contain a sleeping risk, the protection of escape routes is far more critical and, although it is impractical to disallow the use of hold-open devices for cross-corridor fire doors, hold-open devices are not permitted for fire doors protecting vertical escape routes except in sheltered housing and certain mixed user buildings (as these are provided with automatic fire detection systems).

The performance of a fire door when tested in accordance with BS 476-22 is judged by its time to failure (in minutes) for each of the criteria of "integrity" and "insulation"; however, requirements made in connection with regulations and codes of practice do not normally specify any performance for insulation.

For the purposes of this code, fire doors are designated by reference to their required performance (in minutes) for integrity only, e.g. a reference FD 20 implies that the door in that situation should achieve not less than twenty minutes integrity and a reference FD 30 implies not less than thirty minutes integrity when tested in accordance with BS 476-22. Where doors are also required to resist the passage of smoke at ambient temperature, the suffix "S" is added (see **18.6.2**).

Methods for the evaluation of doors to control the movement of smoke will be published as sections of BS 476-31. The methods take account of three different stages of a fire:

a) ambient temperature;

b) medium temperature;

c) high temperature conditions.

NOTE Further information on the performance and function of fire doors is given in PD 6512-1, on the construction of FD 30 fire doors in PD 6512-2, and on the installation and maintenance of fire door assemblies in BS 8214[2)].

Although the above-mentioned system of designation specifically excludes reference to any performance for insulation (because of problems of radiation through traditional fire-resisting glass), Table 1 recommends limits to the extent of non-insulating glazed areas in fire doors in certain circumstances.

Any reference to performance when tested in accordance with BS 476-8 or BS 476-22 is for the purposes of this code only. Depending upon circumstances, a higher performance may be necessary to satisfy building regulations for structural fire protection.

18.6.2 ***Recommendations***

The following recommendations are applicable.

a) A fire door should be provided to comply with the minimum performance recommended for any of the following circumstances:

1) a fire door forming part of the enclosures of:

i) a protected escape route within a house, FD 20;

ii) a protected entrance hall within a flat (see Clause **9** and Figure 4 and Figure 7), FD 20 (except the dwelling entrance door [see item a)3)i)]);

iii) a protected entrance hall and landing within a maisonette (see Clause **10** and Figure 10), FD 20 (except the dwelling entrance door [see item a)3)i)]);

iv) a partition separating living and sleeping accommodation [see Figure 3(b) and Figure 6(b)], FD 20;

v) a protected stairway, FD 30S;

vi) a lobby or corridor approach to a protected stairway, (see **14.7**), FD 30S;

vii) ancillary accommodation (see Table 3, items 1 and 2), FD 30S;

viii) ancillary accommodation (see Table 3, items 3 to 9), FD 60S;

ix) a lift well unless within the enclosure of a protected stairway [see **18.4.2**a)], FD 30;

x) building services ducts etc. [see **18.4.2**b)], FD 30S, unless the duct is fire-stopped at each storey, in which case it should be FD 30;

2) a fire door subdividing a common corridor (see Figure 12, Figure 13 and Figure 17), FD 20S;

3) a fire door affording access:

i) to a dwelling from an internal common corridor or lobby, FD 30S;

ii) to a dwelling from an external balcony or deck, where such balcony or deck is served by only one stair [see Figure 15(b) and Figure 15(c)], FD 20;

iii) on to an external stair, FD 20.

2) In preparation.

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4) a fire door separating at ground or access level a stair and ancillary accommodation in a small single stair building (see **12.3**), FD 30S.

b) A fire door (e.g. FD 30) required to resist the passage of smoke at ambient temperature conditions [i.e. those having suffix S in item a)], should be tested complete with smoke seals in accordance with BS 476-31.1.

c) A fire door [except to a cupboard, refuse chamber or service duct, see item f)] should be fitted with a self-closing device that:

1) should be of a type that cannot readily be disconnected or immobilized and does not embody a stand-open action;

2) should override any latches fitted to the door(s) or, in the absence of a suitable latch or other positive device for holding the door shut in its frame, should be of a type that has been shown by test in accordance with BS 476-8 or BS 476-22 to be capable of holding the door closed in the frame for a sufficient period of time for the closing role to be taken over by a thermally activated sealing device (such as an intumescent seal), or throughout the full period of exposure if such seals are not incorporated.

d) Fire doors within dwellings should either comply with item c) or should be fitted with rising butt hinges.

NOTE Cupboard doors within dwellings need not be self-closing.

e) Unless shown to be satisfactory when tested in accordance with BS 476-8 or BS 476-22, no part of a hinge on which any fire door is hung, and that provides the sole means of support at the hanging edge, should be made either of combustible material or of non-combustible material having a melting point of less than 800 °C.

f) Unless within a dwelling, a fire door to a cupboard or refuse chamber or service duct, in lieu of being self-closing, should have means to enable it to be kept locked shut when not in use and be so marked on both sides with the appropriate sign complying with BS 5499-1.

g) Doors to common stairs [other than in sheltered housing and certain mixed user buildings, see item h)], protected lobbies and ancillary accommodation should not be provided with any means for overriding their self-closing mechanisms.

h) Hold-open systems complying with **18.7** may be provided for holding open fire doors, or for overriding their self-closing devices, in the following situations:

1) across any corridor;

2) to a protected stairway in:

i) sheltered housing; or

ii) a mixed user building provided with an automatic fire detection and alarm system.

Such doors should be suitably marked on both sides, at about eye level, with the appropriate sign complying with BS 5499-1.

i) All fire doors except doors to and within dwellings, doors to cupboards [see item f)], or doors held open by a hold-open device [see item h)], should be marked on both sides, at about eye level, with the appropriate sign complying with BS 5499-1 to the effect that they should be kept closed when not in use.

j) Fire doors on common escape routes should not be fitted with threshold upstands.

18.7 Recommendations for hold-open systems

The following recommendations are applicable.

a) The hold-open system should incorporate an automatic release mechanism complying with BS 5839-3.

b) The automatic release mechanism should release the door to close automatically in the event of each or any one of the following:

1) the detection of smoke by suitable automatic apparatus;

2) failure of the power supply;

3) operation of the manual or automatic fire alarm system;

4) by a manual operation at a central control point.

NOTE 1 Door closers that incorporate a hold-open device are unable to fully satisfy the criteria for compliance with BS 5839-3. Such door closers may be used in the circumstances detailed in **18.6.2**h) if they comply with BS 6459-1, and if they satisfy the criteria for compliance with BS 5839-3:1988 with the exception of Clause **12** of BS 5839-3:1988 (i.e. those relating to durability).

NOTE 2 Door closers that incorporate a free-swing feature, i.e. the door closer operates only in the circumstances described in items b) 1) to 4) with the door closer inoperative at all other times, are unable to fully satisfy the criteria for compliance with BS 5839-3. Such door closers may be used in the circumstances detailed in **18.6.2**h), if they comply with BS 6459-1, and if they satisfy the criteria for compliance with BS 5839-3 with the exception of **8.3.1**, **8.3.4**, **8.3.5**, **9.3.1**, **9.3.3**, **9.3.4**, **10.3.1**, **10.3.2**, **10.3.3**, **11.3.1**, **11.3.2**, Clause **12**, **13.4.4**, **13.4.5**, **14.3.4** and **14.3.5** of BS 5839-3:1988 (i.e. those relating to not releasing during conditioning, not releasing when subjected to a force less than the rated holding force, releasing when subjected to a force greater than the rated holding force, and durability).

18.8 Entrance and alternative exit doors for flats and maisonettes

18.8.1 *Commentary*

As a measure of protection to common escape routes, the entrance door of a dwelling may be required to be self-closing and fire-resisting [see **18.6.2**a)3)]. If such a door is also fitted with a self-locking latch there will be some risk that the door will accidentally become locked during a fire while one of the occupants is outside the dwelling. On the other hand, a deadlock operated only by a key could also be unsatisfactory because of the risk that the key might be missing when wanted in an emergency. It is preferable, therefore, that these doors should be fitted with a lock which can be opened by a handle from either side, and which can be locked on the outside by a key and on the inside only by a manually operated bolt. If a security viewer is provided it should be installed in such a way that the fire resistance of the door is not reduced.

Wherever possible, the installation of letter plates in dwelling entrance (fire) doors ought to be avoided, e.g. by the provision of separate letter boxes or remote mail reception points. If unavoidable, it is essential that the particular combination of fire door, door furniture and position and size of cut-out used has been shown to meet the appropriate performance level. Advice on the selection of door furniture and the positioning and size of cut-out is available from the Association of Builders' Hardware Manufacturers[3)].

18.8.2 *Recommendations*

The following recommendations are applicable.

a) All security locks and/or devices fitted to a dwelling entrance or alternative exit door should be openable from the inside by a single simple manual operation not requiring the use of a key.

b) The provision of locks, letter plates, security viewers, etc. should not reduce the fire resistance of the door to less than that recommended in **18.6.2**a).

[3)] Code of practice for hardware essential to the optimum performance of fire-resisting timber doorsets, ABHM, 1983.

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18.9 Recommendations for doors on escape routes in buildings containing flats or maisonettes

The following recommendations are applicable.

a) Doors affording common means of escape from, and within, the building should:

1) be fitted only with simple fastenings that can be operated from the escape side of the door without the use of a key;

2) be hung clear of any change of floor level;

3) be hung so that they do not reduce the effective width of any escape route across a landing;

4) if opening towards a corridor, be recessed to the full width of the door;

5) where hung to swing both ways, and on all doors subdividing corridors, be provided with at least a vision panel;

6) open not less than 90°.

b) Automatic doors and revolving doors should not be provided across escape routes unless:

1) they are automatic doors complying with BS 7036 and either:

i) they are arranged to fail safely to outward opening from any position of opening; or

ii) they are provided with a monitored fail-safe system for opening the doors if the mains power supply fails; or

2) swing doors to the required width are provided immediately adjacent.

18.10 Recommendations for construction of escape routes

The following recommendations are applicable.

a) The floors of an escape route, including the treads of any stair and the floor of any landing, should have non-slippery even surfaces.

b) Ramps should have an easy gradient in no case steeper than 1 in 12.

18.11 Recommendations for common stairs

The following recommendations are applicable.

a) Stairs should be designed and constructed in accordance with the appropriate part of BS 5395.

b) Spiral or helical stairs should not be provided as common stairs in buildings of four or more storeys.

18.12 Ladders

18.12.1 ***Commentary***

Portable ladders and throw-out type ladders are not considered suitable means of escape. Fixed vertical and raking ladders will only be suitable in exceptional circumstances for engineering services accommodation.

18.12.2 ***Recommendations***

The following recommendations are applicable.

a) Ladders should not be provided as means of escape from any dwelling.

b) Ladders should be provided as means of escape from engineering services accommodation only in exceptional circumstances where it is impractical to provide a more satisfactory escape route. Such ladders should be constructed of non-combustible materials, and

1) if raking, should be fixed at an angle not steeper than 60° to the horizontal and be provided with flat treads 130 mm in depth and not more than 200 mm apart;

2) if vertical, should be in accordance with BS 4211.

18.13 Lift machine rooms

18.13.1 *Commentary*

If a lift well is located within a common escape route the preferred location of the lift machine room is either above or outside the common escape route.

18.13.2 *Recommendation*

Lift machine rooms should comply with the appropriate part of BS 5655.

18.14 Recommendations for the siting of gas and electricity meters

The following recommendations are applicable.

a) The position of meters should be agreed with the supply authority at the planning stage. Gas and electricity meters should preferably not be located in the entrance hall of a dwelling but if a meter is so positioned it should be contained within a suitably constructed cupboard large enough to contain only the meter(s).

b) Where meter boxes are required, gas meters and electricity meters should be housed in separate boxes, each large enough only for the meter and associated equipment.

c) To facilitate external meter reading and attendance, the meters in flats and maisonettes may be accessible or visible from a common circulation space (but not a common stairway) through strong doors provided with locks. When required, glazed viewing panels large enough to expose dials and meter number may be provided. If meters are inset in any fire-resisting wall or partition they should be separated at the back and sides from the dwelling by non-combustible construction having the same fire resistance as that recommended for the element in which they are placed.

NOTE 1 Gas meters may not be installed in corridors in single stair buildings or in dead-end corridors (see **24.3**).

d) Gas meters and associated equipment should be installed in accordance with BS 6400 (see also **24.3**).

e) Electricity meters and associated equipment should be installed in accordance with the IEE Wiring Regulations.

NOTE 2 The distance between electricity meters and gas meters not placed in meter boxes is covered in BS 6400.

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Section 5. Accommodation ancillary to flats and maisonettes

19 General

19.1 Ancillary accommodation

19.1.1 *Commentary*

Ancillary accommodation covers all those parts of buildings containing flats or maisonettes that are ancillary to the dwellings. In addition to rooms associated with engineering services, such accommodation includes common amenity areas, refuse rooms and covered car parks.

Ancillary accommodation tends to present a greater fire hazard than dwellings because the accommodation may only be occasionally visited and therefore not under regular surveillance. Ancillary areas therefore need to be adequately separated from the residential areas. The degree of separation varies according to the risk, and the following recommendations should be read in conjunction with Section 3.

19.1.2 *Recommendations*

The following recommendations are applicable.

a) Ancillary accommodation should have escape routes of such number and be so situated that the travel distance from any point does not exceed the limitations given in Table 2.

b) Ancillary accommodation should not connect with any part of the only escape route from one or more dwelling(s) on the same storey as the ancillary accommodation.

c) In multi-stair buildings:

1) ancillary accommodation should be separated from any stair by a protected lobby or protected corridor (see **14.6**) at the storey in which the accommodation is situated;

2) ancillary accommodation should be separated from any common corridors by a protected lobby.

d) Ancillary accommodation should be separated from other parts of the building in accordance with Table 3.

e) Glazed areas separating escape routes from ancillary accommodation should be in accordance with **18.5.2**.

19.2 Higher fire risk areas

All ancillary accommodation, with the exception of communal lounges, common amenity areas and transformer, switchgear and battery rooms for low voltage or extra low voltage equipment, should be treated as higher fire risk areas.

19.3 Engineering services installation rooms

19.3.1 *Commentary*

Engineering services installation rooms include electrical switchgear rooms, boiler rooms, fuel storage spaces, mechanical ventilation and air conditioning plant rooms, lift motor rooms, rooms housing fixed internal combustion engines and battery charging rooms.

19.3.2 *Recommendations*

The following recommendations are applicable.

a) Service installation rooms should be sited so that escape from other exits is not prejudiced by the risk of such a service installation room.

b) Service installation rooms in which flammable liquids are used or stored should have imperforate cills to doorways and any necessary drainage should be provided with interceptors.

c) Service installation rooms should, where necessary for the safe operation of the equipment and to avoid undue build-up of heat, be ventilated (either directly or indirectly) to the outside air. The provision of such ventilation should not impair any fire resistance requirements for the structure.

NOTE This ventilation may be combined with the provisions for smoke venting (see Clause **37**).

d) Service installation rooms adjoining a building (including those on top of a flat roof) should be separated from the building in accordance with Table 3.

Table 2 — Maximum travel distances in areas of ancillary accommodation

Ancillary accommodation	Cross-reference	Maximum part of travel distance within the room or area		Maximum travel distance to the nearest storey exit	
		Escape in one direction only m	Escape in more than one direction, in directions 45° or more apart m	Escape in one direction only m	Escape in more than one direction, in directions 45° or more apart m
1. Communal lounges and common amenity areas	**17.4**, **19.1**	6	12	18	45[a]
2. Engineering services installation rooms	**19.3**				
3. Boiler rooms	**20.1**				
4. Fuel storage areas	**20.2**				
5. Transformer, battery and switchgear rooms	**20.3**				
6. Covered car parks	**22**	18	45[a]		

[a] This may include up to 18 m with escape in one direction only.

Table 3 — Structural fire protection of areas of ancillary accommodation

Ancillary accommodation	Cross-reference	Structural fire protection: the area of ancillary accommodation should be separated from other parts of the building by:
1. Communal lounges and common amenity areas	**17.4**, **19.1**	Robust construction having a minimum standard of fire resistance of 30 min (see Note)
2. Transformer, switchgear and battery rooms for low voltage or extra low voltage equipment	**20**	
3. Engineering services installation rooms other than those covered by items 2 and 6 to 8 inclusive	**19.3**	Robust construction having a minimum standard of fire resistance of 60 min (see Note)
4. Refuse chutes and refuse storage areas	**21**	
5. Covered car parks within or adjoining the building and not greater than 450 m^2 in area	**22**	
6. Engineering services installation rooms housing fixed internal combustion engines	**19.3**	Robust construction having a minimum standard of fire resistance equivalent to that required for the elements of construction of the building and in no case less than 60 min (see Note)
7. Boiler rooms and fuel storage spaces	**20.1**, **20.2**	
8. Transformer and switchgear rooms for equipment above low voltage	**20**	
9. Covered car parks within or adjoining the building and greater than 450 m^2 in area	**22**	

NOTE Any openings in the required construction should be protected by doors having a similar standard of fire resistance and capable of resisting the passage of smoke at ambient temperature.

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20 Boiler rooms, fuel storage areas and transformer, battery and switchgear rooms

20.1 Boiler rooms

20.1.1 ***Commentary***

In the design of a boiler room and ancillary spaces the possibility of a future change to other fuels may require consideration.

20.1.2 ***Recommendations***

The following recommendations are applicable.

a) Oil fired installations should be in accordance with BS 5410-1 and BS 5410-2.

b) Town, natural and liquefied gas installations should be in accordance with BS 6798 or BS 6644.

c) Boiler rooms (other than those covered by BS 5410-2) should have adequate provision for smoke venting.

20.2 Recommendations for fuel storage areas

The following recommendations are applicable.

a) Oil should be stored in accordance with BS 5410-1 and BS 5410-2 and BS 799-5.

b) Solid fuel should be stored in bunkers protected by non-combustible walls of sufficient thickness to prevent heating of the fuel by boilers or steam pipes.

c) Fuel storage areas (other than those covered by BS 5410-2):

1) should have adequate provision for smoke venting;

2) if for the bulk storage of liquefied petroleum gas, should be in accordance with the Health and Safety Executive guidance booklet HS (G) 34 and guidance notes CS4 and CS11.

20.3 Recommendations for transformer, battery and switchgear rooms

The following recommendations are applicable.

a) A transformer, battery or switchgear room, unless situated on the roof or in a separate enclosure, should be sited adjacent to an external wall and entered only from the open air.

b) A transformer, battery or switchgear room should have adequate provision for ventilation.

21 Refuse disposal and storage

21.1 Commentary

It is essential that provision is made for the disposal or storage of refuse from dwellings.

In low rise multi-stair blocks, rooms may be provided for the storage of refuse (in lieu of a refuse chute system). However, it is important that any access lobby (see **14.6.2**) to such a room is of the minimum possible size to prevent its use for the storage of refuse, and that access is not by way of a dead-end corridor.

BS 5906 recommends that a refuse chute system is provided in blocks of more than four storeys: refuse hoppers are provided on each storey served by the refuse chute, with the refuse falling through the chute into a refuse storage chamber located at a level accessible directly by refuse disposal vehicles.

21.2 Recommendations

The following recommendations are applicable.

a) Refuse storage chambers, refuse chutes and refuse hoppers should be sited and constructed in accordance with BS 5906.

b) Refuse storage chambers should be approached solely from the outer air and should be separated from other parts of the building in accordance with Table 3. Access to refuse storage chambers should not be sited adjacent to escape routes or final exits or near to windows of dwellings.

c) Refuse chutes and rooms provided for the storage of refuse should be separated from other parts of the building in accordance with **19.1.2**, and should not be located within common stairways or protected lobbies. Rooms containing refuse chutes or provided for the storage of refuse should be approached only by way of a small protected lobby provided with not less than 0.2 m^2 of permanent ventilation.

22 Car parks

22.1 Commentary

Car parks within or adjoining a building, and any storage of petrol in cans, drums or other receptacles, may be required to be licensed under the Petroleum (Consolidation) Act 1928 by the Petroleum Licensing Authority for the area, which therefore needs to be consulted.

22.2 Recommendation

Any car park within or adjoining the building whether required to be licensed or not:

a) should have any external openings situated so as not to endanger any escape route or final exit from the residential accommodation;

b) should have adequate provision in accordance with Clause **37** for venting smoke;

c) should be provided with suitable access for fire-fighting (see Clause **35**).

NOTE A covered car park in a single stair building served by the stair or lift needs to be provided with permanent cross-ventilation (see **36.7**).

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Section 6. Engineering services in buildings containing flats or maisonettes

NOTE Recommendations for rooms containing engineering services are given in Section 5.

23 General

23.1 Engineering services

In this code, engineering services comprise the following:

a) gas services;

b) electrical services and wiring;

c) lighting;

d) communal heating systems;

e) ventilation and air conditioning systems;

f) refuse incineration.

23.2 Enclosure of engineering services

23.2.1 *Commentary*

Some engineering services are known potential sources of fire, and the equipment associated with them should be installed and maintained in accordance with the relevant codes of practice.

The importance of correct installation in the first place is emphasized, because lighting, heating and ventilation systems are often concealed above suspended ceilings and within service ducts. Control gear is also often located behind ceiling and wall panels. Installation faults that might lead to fire are particularly dangerous because the fire is likely to remain undiscovered for some time if it is concealed. Rooms in which engineering services are contained are dealt with under ancillary accommodation in **19.1**.

23.2.2 *Recommendation*

Ducts for engineering and building services should comply with BS 8313; ducts and ductwork for ventilation and air conditioning should comply with BS 5588-9.

24 Gas services

24.1 Commentary

The installation of gas fittings, including installation pipework, meters and appliances, is controlled by the Gas Safety (Installation and Use) Regulations 1984. Service pipes are subject to the provisions of the Gas Safety Regulations 1972. The recommendations are intended to alert the designer to the regulations he will need to follow, and reference should be made to them for specific details.

NOTE Further guidance may also be found in the following publications.

a) Gas services: Institution of Gas Engineers Publication IGE/TD/4.

b) Low pressure installation pipes: BS 6891.

24.2 Recommendations for service and installation pipework

The following recommendations are applicable.

a) Installation and service pipes should not be run in escape routes unless this cannot be avoided.

b) All gas services and installation pipes should be installed such that the fire resistance of the building is unimpaired.

24.3 Recommendations for meter installations

The following recommendations are applicable.

a) A meter should not be installed on or under a stairway or in any other part of any building with not more than one floor above the ground floor where the stairway or that other part of the building provides the only means of escape in case of fire unless:

1) the meter is:

i) of fire-resisting construction; or

ii) housed in a protected compartment[4]; or

2) the pipe immediately upstream of the meter, or, where a governor is adjacent to the meter, immediately upstream of that governor, incorporates a device to cut-off automatically the flow of gas if the temperature of the device exceeds 95 °C.

b) A meter should not be installed on or under a stairway or in any other part of a building with two or more floors above the ground floor, where the stairway or that other of part of the building provides the only means of escape in case of fire, unless the meter replaces an existing meter and either item a)1) or item a)2) is complied with.

NOTE Further advice on metering installations may be found in BS 6400.

25 Electrical services

25.1 Recommendation for electrical installations

Electrical services should be installed and maintained in accordance with the IEE Wiring Regulations.

25.2 Recommendation for protected circuits

A protected circuit should:

a) consist of cable meeting the requirements for classification as CWZ in accordance with BS 6387;

b) follow a route selected to pass only through parts of the building in which the fire risk is negligible;

c) be separate from any circuit provided for another purpose.

25.3 Recommendation for meter installations in single stair buildings

In single stair buildings meters should not be installed within a common escape route unless enclosed within a secure cupboard (with access only to the electricity supply company) which is separated from the common escape route by construction with a fire resistance of 30 min.

25.4 Firemen's emergency switches for discharge lighting installations

Discharge lighting installations may operate at voltages that are a hazard to firemen. An exterior discharge lighting installation, or an interior discharge lighting installation operating unattended, operating at a voltage exceeding low voltage, ought to be controlled by a firemen's emergency switch, installed and situated in accordance with the IEE Wiring Regulations and the requirements of the fire authority.

26 Lighting

26.1 Types of luminaire

Tubular fluorescent luminaires operate at relatively low temperatures and the tubes themselves are not likely to be a source of fire. Electrical breakdown of associated gear and wiring in the luminaire, however, may lead to ignition of adjacent combustible materials. Correct installation is therefore essential.

All incandescent filament lamps and high pressure discharge lamps operate at elevated temperatures, and where these are used they should not be close to or fixed to materials that are readily ignited. Minimum separation distances are given in the IEE Wiring Regulations. Care should be taken in the selection of plastics materials or finishes and preference should be given to those with superior flame retardant qualities.

[4] The term "protected compartment" in this context means an enclosure of fire-resisting construction fitted with a self-closing fire door. Further details are given in the Gas Supply (Installation and Use) Regulations, 1984.

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26.2 Lighting of common escape routes in buildings containing flats or maisonettes

26.2.1 *Commentary*

Occupants of flats or maisonettes can be expected to be familiar with normal circulation stairs, corridors, etc. However, provision should be made for lighting of common escape routes in certain places to ensure that the occupants and visitors to the building can see their way to safety should the main electricity supply fail for any reason. It should also be possible for them to see any directional or warning signs associated with common escape routes, changes in floor level, the location of fire alarm call points and firefighting equipment. If an escape lighting system is not provided it is essential that the lighting circuit(s) is protected against fire.

The essential feature of escape lighting is that it is designed to illuminate when part or all of the normal lighting has failed. There are various types of escape lighting, e.g. maintained alight continuously; not alight until the mains fail, then lighting automatically; single independent luminaires or central battery or generator systems, etc.

26.2.2 *Recommendations*

The following recommendations are applicable.

a) Adequate artificial lighting should be provided in all common escape routes and should be of a sufficient standard to enable persons to see to escape.

b) In addition to the system of artificial lighting, escape lighting should be provided within:

1) windowless accommodation normally accessible to the occupants;

2) windowless common stairs;

3) internal common corridors exceeding 30 m in length;

4) common stairs in buildings higher than 18 m (see **2.27**);

5) all common escape routes in sheltered housing;

6) common escape routes across a flat roof.

c) Escape lighting systems should conform to the appropriate recommendations of BS 5266-1.

d) The lighting circuits of common escape routes not provided with escape lighting should be protected circuits.

27 Heating systems

27.1 Commentary

Experience has shown that, in buildings of all sizes, few fires are caused by central heating systems, i.e. systems in which energy conversion takes place at one point in the building. The majority of fires from heating appliances are produced by local heating units, particularly those that are not fixed (see BS 5588-12). It is therefore essential that each dwelling is provided with a suitable fixed heating system.

Central heating (water) systems, whether high or low pressure, and whether fired by solid fuel, gas, oil or with a facility to burn alternative fuels, should give rise to little fire risk when installed in accordance with building regulations and relevant standards.

With ducted warm air heating systems, rigorous precautions are necessary to avoid any risk that the system will permit either the products of combustion to be distributed through the ductwork or that a fire starting in one part of a dwelling or building will be transferred to another part of a dwelling or building.

In common escape routes electric and gas heaters should be of the convector rather than the radiant open element type, and should present little fire risk. Although gas convector heaters are available in flued and flueless versions, the former are preferable.

An electrical thermal storage system, whether used as underfloor heating or as individual heaters, depends for its safety on being installed in such a manner or in such positions that the risk of overheating and ignition of adjacent materials is eliminated.

The installation of heating appliances and systems is controlled by building regulations and by regulations applicable to the fuel(s) used.

27.2 Recommendation for the installation of heating appliances and systems

All heating appliances and systems should comply with appropriate standards and should be installed in accordance with the relevant standards and codes of practice.

27.3 Recommendation for ducted warm air heating systems serving more than one dwelling

If the system recirculates air, smoke detectors should be provided within the extract ductwork which, on operation, will cause the recirculation of air to stop and the direction of all extract air to the outside of the building.

NOTE See Clauses **6** and **15** for recommendations for individual dwellings.

28 Mechanical ventilation and air conditioning

28.1 Commentary

Mechanical ventilation may vary from a simple ventilation system to full air conditioning. In large buildings, extensive ductwork is likely to be required, and an understanding of the principles of fire protection in such systems is essential to avoid fire hazards, of which the major ones are as follows.

a) Flames and hot gases, by breaking into and out of horizontal or vertical ductwork, can spread a fire from one part of the building to another. If the ductwork insulation is flammable this hazard is greater.

b) Flames may spread to another part of the building because of lack of fire-stopping around ductwork.

c) In the event of a fire, a ventilating or air conditioning system using a proportion of recirculated air may distribute smoke and hot gases throughout the building.

d) In higher buildings with sealed windows, the smashing of glass to facilitate smoke removal could result in a hazard to people from falling glass or flying shards. This situation may be avoided if smoke venting openable windows are installed in accordance with the recommendations of **37.4**.

It is also important to ensure that the movement of air is away from escape routes so as to prevent, as far as possible, smoke-laden air being carried into protected escape routes and exits.

Mechanical ventilation and air conditioning plant rooms are most likely to be situated in a basement, on the roof, or possibly both. The main risk of fire in such areas, provided the enclosures are adequate, is from the nature of the installation itself, unless there is provision for an automatic fire detection system to close down the plant, and unless adequate fire dampers are included in the ductwork system.

Pressurization systems are covered in Clause **36**. However, if a pressurization system is to be employed for the protection of escape routes against the ingress of smoke and toxic gases, the accepted practice in the design of ventilation and air conditioning systems should be modified so as to achieve compatibility between the ventilation system and the pressurization system.

28.2 Recommendations

The following recommendations are applicable.

a) Mechanical ventilation and air conditioning plant should be installed in accordance with BS 5720.

b) Service ducts should be installed in accordance with BS 8313 and ventilation and air conditioning ductwork should be installed in accordance with BS 5588-9.

c) Any system of mechanical ventilation should be designed to ensure that the normal airflow pattern is away from protected escape routes and exits.

d) Ventilation and air conditioning systems should be compatible with any pressurization system installed (see Clause **36**).

29 Refuse incinerators

29.1 Commentary

The fire risk arises from the nature and bulk of the refuse to be burnt. The means of flueing incinerators are controlled by building regulations with regard to the discharge of products of combustion and the risk of fire spread.

29.2 Recommendation

Incinerators should be isolated in a separate building.

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Section 7. Fire protection facilities for buildings containing flats or maisonettes

30 General

The contents of Section 2 and Section 3 of this code deal with those passive aspects of fire protection in which the fixed and permanent features of the design and construction of the building are so selected and disposed as to provide either control of the progress of a fire or protection of the occupants of the building in the event of fire, or both. The contents of this section and BS 5588-12 deal with those active measures of fire protection in which provision is made for taking action to discover a fire, to give the alarm, to check the development of a fire, to extinguish a fire, and to secure the safe escape of the occupants.

These active features of fire protection are divided into physical and mechanical equipment and systems (dealt with in this section), and those activities designed to secure that the correct action will be taken by occupants, either to avoid the occurrence of fire altogether or to ensure that, in the event of fire, appropriate action is taken (dealt with in BS 5588-12).

The contents of this section are a miscellany in the sense that some arise from legal requirements relating to life safety, whereas the remainder recommend installations or equipment a wise owner will provide in the building for the reduction of risk of property loss. Because the facilities required for use by the fire service may vary from one area to another, consultation at an early stage with the fire authority is desirable.

31 Fire detection and alarm systems

31.1 General

There is no statutory requirement for a common fire alarm system to be provided in a building solely containing flats and/or maisonettes and, in buildings designed and constructed in accordance with this code, it is generally unnecessary and undesirable for a fire alarm system to be provided. A common fire alarm system ought to be provided only in a building in which some control can be achieved over the occupants so that a pre-determined response leading to the evacuation of the building can be triggered.

In flats and maisonettes in normal use this kind of response cannot be achieved, nor is it necessarily desirable that evacuation should take place from areas remote from the fire, unless these areas themselves become threatened by fire. However, there may be circumstances in which a common fire alarm system is necessary and these include the following:

a) sheltered housing;

b) flats and/or maisonettes which form part of a mixed user development;

c) flats or maisonettes which, although not sheltered housing, are occupied predominantly by elderly and/or handicapped persons.

Automatic fire detection may need to be installed for a number of reasons:

1) to monitor part of a building left unattended at night in which there may be a fire hazard;

2) to operate active fire protection equipment, for example closing down ventilation plant, activating pressurization systems, opening smoke ventilators or releasing fire doors held open by retaining mechanisms.

To be most effective a fire detection system should pass a signal to some central point, e.g. a warden, lodge porter or central fire alarm station, that will enable the detection of fire to be made known and assistance to be called.

The time taken to evacuate sheltered housing, should the need arise, would be far longer than that required under a normal mixed user occupancy, and it is essential that a potential fire situation is identified at the earliest possible moment in order to alert the fire service and to initiate any necessary evacuation. This is best achieved by the installation of an automatic fire detection and alarm system.

A smoke detector ought to be sited within each dwelling in order to provide the earliest possible warning of fire, and is best sited within the entrance lobby to provide a central detection source. The purpose of siting a smoke detector within a dwelling is to reduce the time interval between a fire starting and its detection, and to provide primary warning of a fire at the fire source rather than through contamination of a common escape route.

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Smoke detectors ought also to be sited within all common access/escape routes and communal areas. Where different types of smoke might be given off in a fire because of a mixture of materials that could ignite, for example in communal lounges, consideration could be given to a mix of ionization and optical smoke detectors.

In buildings where a warden is resident a repeater panel needs to be located within or adjacent to the warden's living quarters in order to facilitate rapid response to a fire situation, as the time taken for a warden to respond via the main control panel could prove detrimental to the health and safety of the occupants. A guest suite also needs to be fitted with a repeater panel if used by a relief warden.

Where 24 h on-site supervision is not available provision should be made for automatically alerting the fire service: for further details see Clause **8** and Appendix A of BS 5839-1:1988.

The purpose of the automatic fire detection system is to either alert the person who is on duty or the central control so that the fire service can be called. Provided the alarm system is such that whoever is on duty will be alerted, if necessary woken up if they are asleep, there is no need for the alarm system to wake up the occupants other than those in the dwelling of origin. This may be achieved by providing either an individually addressable fire alarm device, or a self-contained smoke alarm (in addition to a smoke detector connected to the automatic fire detection and alarm system) in each dwelling.

31.2 Recommendations for automatic fire detection and alarm systems

The following recommendations are applicable.

a) The design, installation and maintenance of any automatic fire detection and alarm system should be in accordance with the relevant recommendations of BS 5839-1.

b) Self-contained smoke alarms should be installed only for the protection of individual dwellings (see **8.2**).

c) Buildings containing sheltered housing should be provided with a type L1 or type L2 automatic fire detection and alarm system designed, installed and maintained in accordance with BS 5839-1:1988; and

1) each dwelling and each guest suite should be provided with both a smoke detector and a fire alarm device [see item 5)];

2) all common escape routes and all communal areas should be provided with smoke detectors and fire alarm devices [see item 5)];

3) each dwelling or guest suite, communal area, common escape corridor and common stair should be indicated separately at the main control panel (and at any repeater panels);

4) wardens' offices, wardens' living quarters and any guest suites used by relief wardens, unless adjacent to the main control panel, should be provided with repeater panels;

5) fire alarm devices should give both a visual and an audible warning of fire;

6) in the event of a fire the alarm should be sounded in the following areas:

i) in the dwelling or area of origin;

ii) in all common escape routes;

iii) in any accommodation used by wardens;

iv) in any communal areas or ancillary accommodation.

d) Where any part of a mixed user building is protected by an automatic fire detection and alarm system, the system should provide any dwellings in the building with type L1X or type L2X protection as described in BS 5839-1:1988.

32 Special risk protection

32.1 Commentary

There may be special risks which justify the installation of an automatic extinguishing system associated with the risk alone and guidance on the choice of system etc. is given in 5306-0. Examples already mentioned elsewhere in this code are service installation rooms, e.g. transformer and switchgear rooms (see **20.3**), and ventilation systems (see Clause **28**).

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Fire risks, such as oil storage tank chambers and oil fired boiler rooms, for which foam is used as the extinguishing medium, may be situated where the fire service cannot obtain access to the space for the purpose of applying foam. The most common situation is where such risks are below ground.

If it is not possible to apply foam through windows, louvres, etc., then foam inlets complying with BS 5306-1 are required. These consist of an inlet or inlets to which fire service equipment can be connected, piping from that external point to inside the space, and a fitting or fittings at the delivery end of the pipe placed suitably for the protection of the risk.

32.2 Recommendation

Automatic fire extinguishing systems, foam inlets and equipment on premises should be installed, in consultation with the fire authority, in accordance with the appropriate parts of BS 5306.

33 Manual firefighting equipment

33.1 Commentary

Although the provision of equipment for firefighting purposes may not be a legal requirement in all parts of the United Kingdom, it is nevertheless considered desirable for such provision to be made in all circumstances where vandalism would not be likely.

The fire authority should be consulted as regards the provision, siting, etc. of all manual firefighting equipment. Water supplies for firefighting are dealt with in Clause **34**.

33.2 Recommendations

The following recommendations are applicable.

a) Portable fire extinguishers should comply with BS 5423 and should be installed and maintained in accordance with BS 5306-3.

b) Hydraulic hose reels should comply with BS 5274 and should be installed in accordance with BS 5306-1.

c) Communal kitchens should be provided both with a portable extinguisher with a rating not less than 8A and 89B as given in BS 5423, and with a fire blanket complying with BS 6575.

d) Wardens' offices, wardens' living quarters and, if used by relief wardens, guest suites should be provided with a water or foam or powder portable extinguisher with a rating of not less than 13A as given in BS 5423.

34 Water supplies for firefighting

34.1 Commentary

Water supplies for firefighting are normally provided from hydrants, either those of the water authority on street mains or private hydrants installed by the building owner or developer. Hydrant systems include internal fire mains, whether wet or dry, fitted with landing valves, and private hydrants on water mains external to the building.

However, in areas without available mains, a bulk or "static" supply should be arranged. If this takes the form of a static tank or dam the capacity required is related to the size of the building and the risk involved, and should be agreed with the fire authority. An unlimited and guaranteed natural water source may be acceptable to the fire authority subject to adequate access and hard standing for appliances being provided.

Internal rising fire mains enable the fire service to attack a fire on any storey of a building, however high, without the time-wasting necessity for laying out hose to that storey, whether inside or outside the building. All buildings with a height (see **2.27**) exceeding 18 m will be provided with fire mains as part of the provision of a firefighting shaft (see **35.3**). In all other buildings the provision of fire mains should ensure that all parts of the building are within 60 m of a landing valve on a fire main.

34.2 Recommendations

The following recommendations are applicable.

a) All premises should be provided with an adequate supply of water for firefighting purposes by one of the following means:

1) hydrants complying with BS 5306-1 and any relevant water legislation for the area; or

2) a static or natural water supply satisfactory to the fire authority.

b) Internal fire mains should be installed in accordance with BS 5306-1. If the highest floor does not exceed 60 m above ground level, dry fire mains may be installed, but if 60 m is exceeded wet fire mains should be installed.

c) Landing valves complying with BS 5041-1 and BS 5041-2 should be so placed that all parts of the building are within 60 m measured along the line on which hoses will be laid. If this distance cannot be achieved with one fire main, additional fire main(s) should be provided.

35 Access for firefighting

35.1 Access for fire appliances

In making provision for access for fire service appliances it will be necessary to consult the fire authority to ascertain their recommendations relating to access roads in terms of loadbearing capability, turning circles, width, headroom, etc., provision of hard standing areas adjacent to the building for rescue purposes, and proximity to dry riser inlets.

35.2 Access for fire service personnel

Provision should be made in high buildings for fire service personnel to reach every dwelling by way of a firefighting lift. Recommendations for the layout, construction and facilities to be incorporated in the firefighting lift, lobbies and stair are given in BS 5588-5.

35.3 Recommendations

The following recommendations are applicable.

a) Buildings or parts of buildings of height (see **2.27**) exceeding 18 m or depth (see **2.13**) exceeding 9 m should be provided with firefighting shafts (each incorporating a firefighting lift) complying with BS 5588-5, except that the size of the firefighting lobby may be larger than that recommended in BS 5588-5. However, the distance between the firefighting lift landing doors and the door to the firefighting stair should not exceed 7.5 m.

NOTE The reference to parts of buildings covers situations such as a tower block rising above a podium.

b) Sufficient firefighting shafts should be provided such that on every storey:

1) with a height (see **2.27**) exceeding 18 m; or

2) with a depth (see **2.13**) exceeding 9 m;

the area on that storey served by any firefighting shaft does not exceed 900 m^2 and the distance along which hose can be laid from the fire main to any point on that storey does not exceed 60 m.

36 Smoke control for means of escape

36.1 General

If stairs and corridors are to be safely used to escape from a fire in a building occupied for non-residential purposes, it is only necessary for them to be kept free from smoke and heat until evacuation of the building has taken place, and relatively simple measures are considered adequate. However, as evacuation is considered necessary for only those persons immediately at risk in buildings comprising flats or maisonettes, special provisions are necessary to ensure that the stairways and corridors remain relatively free from smoke and heat, particularly in the case of single stair designs of unlimited height. It is also important to prevent any smoke or heat resulting from a fire in a basement, car park or other area of higher fire risk prejudicing any stair which connects with residential storeys.

Provision is also necessary for the release (by the fire service) of smoke and heat from stairways and floor areas, particularly those below ground. This is covered in Clause **37**.

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No system of smoke control can be regarded as being 100 % effective. The more sophisticated the system the more that system is dependent upon its being satisfactorily maintained for it to function as intended. In particular, whilst pressurization may be regarded as being the most effective system of smoke control, its efficiency can be impaired through lack of maintenance. For this reason there are no increases in travel distance in buildings provided with smoke control by pressurization. The advantage that a pressurization system offers is, therefore, confined to buildings where the site does not readily lend itself to the provision of other forms of smoke control dependent upon having openings (for smoke ventilation) direct to the outer air.

36.2 Smoke control within common corridors where every dwelling does not have an alternative escape route to a common stair

36.2.1 *Small buildings*

36.2.1.1 *Commentary*

Where the escape route from a dwelling to a common stairway is not provided with smoke ventilation the assumption should be that this space may become filled with smoke within a relatively short time. For this reason, the travel distance from a dwelling to the door to the common stairway needs to be strictly limited.

36.2.1.2 *Recommendation*

The design should be in accordance with the principles indicated in Figure 14.

36.2.2 *Single stair buildings above 11 m in height*

36.2.2.1 *Commentary*

In single stair buildings above a height at which fire service rescue may reasonably be discounted, it is necessary to ensure that the smoke control provisions ensure so far as is reasonably practicable that the escape route from a dwelling to the common stair will be relatively free from smoke. To this end an automatic ventilator is necessary to ensure that some venting of smoke takes place whilst the occupants are making their escape before the arrival of the fire service.

In a building which is planned so that there is accommodation on both (or more) sides of the common stair it is necessary to isolate the various wings of the building by fire doors to ensure that all corridors do not become contaminated by smoke.

36.2.2.2 *Recommendation*

The design should be in accordance with the principles indicated in Figure 12.

36.2.3 *Multi-stair buildings*

36.2.3.1 *Commentary*

In multi-stair buildings, particularly those in which dead-ends do not exist (i.e. the occupiers of all dwellings can turn their backs on a fire and make their escape in an opposite direction) the system of smoke control becomes less critical.

The smoke control provisions need only ensure that the escape routes from all the dwellings to the common stairs do not become totally contaminated by smoke.

This can be achieved by subdivision of such routes by fire doors, and any ventilation provided to clear smoke can be operated manually by the fire service.

Where, however, dead-ends exist in a multi-stair building, the situation for the occupants of dwellings in such dead-ends is much the same as for occupants of dwellings in a building provided with a single stair, and the smoke control provisions should, therefore, reflect this.

36.2.3.2 *Recommendation*

The design should be in accordance with the principles indicated in Figure 13.

36.3 Smoke control in balcony/deck approach buildings

36.3.1 *Commentary*

There are no particular problems relating to smoke control in buildings where the approach to dwellings is by way of an open balcony or deck except with regard to the design of the soffit (see **13.2**).

36.3.2 *Recommendation*

The design should be in accordance with the principles indicated in Figure 15.

36.4 Smoke control in corridors where every dwelling is provided with an alternative escape route to a common stair

Where the occupants of a dwelling do not have to use their normal means of access as their only escape route it is only necessary for their normal access route to be provided with ventilation to clear smoke that can be operated manually by the fire service.

36.5 Recommendations for smoke control by pressurization

The pressurization system should be designed and installed in accordance with BS 5588-4.

36.6 Recommendation for smoke control for protected lobbies and corridors

Protected lobbies and protected corridors separating protected stairways from ancillary accommodation in small single stair buildings, enclosed car parks and higher fire risk areas should be provided with an area of permanent ventilation of not less than 0.4 m^2.

36.7 Recommendation for smoke control for covered car parks in single stair buildings

If the stair and/or lift serves the car park then the car park should be provided with cross-ventilation such that the stair enclosure and lift well are kept smoke free. The ventilation should be provided by permanent vents with an area of not less than 2.5 % of the floor area of the car park.

37 Smoke control for firefighting

37.1 Commentary

The need for smoke control on protected stairways and in basements will be at its greatest in the later stages of the development of a fire. The fire service may need to release smoke from any protected stairway and from floor areas. Means for smoke control are also used for the release of heat.

Smoke control is usually obtained by opening windows. Unfenestrated walls or walls sealed for the purpose of air conditioning will need to be provided with other openable means to serve the same purposes, and in basements, smoke outlets may have to be provided if windows cannot be provided. It should however be appreciated that such smoke control provisions are not required for means of escape purposes, nor is it intended that they be operated by the occupants.

Smoke control for firefighting stairs is covered in BS 5588-5 because these stairs provide the fire service with safe access to, and escape from, high buildings.

37.2 Recommendation for smoke control on unpressurized protected stairways

An unpressurized protected stairway enclosure (other than a firefighting stair enclosure) should be provided with:

a) a window having a clear openable area at high level of not less than 1.0 m^2 at each upper storey or landing level; or

b) a window or vent at the top having a clear openable area of not less than 1 m^2.

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37.3 Recommendation for smoke control in floor areas of basement storeys

Basement storeys should either:

a) be provided with openable windows or other means aggregating not less than 2.5 % of the floor area, arranged to induce cross-ventilation; or

b) be provided with smoke outlets that should:

1) be situated at high level in well distributed positions along street frontages or adjacent to external walls easily accessible to the fire service;

2) be as numerous and as large as possible;

3) aggregate not less than 2.5 % of the floor areas they serve;

4) if covered, have breakable covers;

5) if permanently open, be sited away from exits.

37.4 Recommendations for means of opening of windows and vents for smoke control of common areas

The following recommendations are applicable.

a) All openable windows and vents provided for smoke control should be clearly identifiable and should be fitted with:

1) simple lever handles; or

2) locks that can be operated by the fire service with a square-ended key.

b) If openable windows and vent openings are not easily accessible, provision should be made for their operation by a remote control mechanism that, in the case of any vent provided in accordance with **37.2**b), should be located adjacent to the entrance doorway in the ground/access storey and be clearly marked as to its function and means of operation. Vents provided in accordance with **37.2**b) should also be provided with local control at the topmost storey served by the stair.

37.5 Recommendation for breakable covers

Breakable covers provided in accordance with **37.3**b) should be capable of being opened by the fire service from outside the building and a permanent notice identifying the area they serve should be provided on or adjacent thereto.

37.6 Recommendation for shafts for smoke outlets

The following recommendations are applicable.

a) If it is not possible or convenient for a smoke outlet to terminate at a level accessible to the fire service, the shafts may be led up through the building to discharge direct to the open air at a suitable point, and the outlets should be maintained unobstructed or be covered only with a non-combustible grille and/or with non-combustible louvres.

b) Shafts serving smoke outlets should be:

1) provided separately from different basement levels and from such accommodation as boiler rooms, rooms containing oil-filled switchgear, storage spaces and car parks;

2) sized to give an overall airflow resistance equivalent to that of a simple vent;

3) enclosed with solid non-combustible material having not less than the period of fire resistance required for the storey served, or through which they pass, whichever is the higher.

38 Plans for fire service use

In large buildings consisting of flats or maisonettes, particularly high buildings or those having extensive accommodation below ground level, it is of considerable advantage to the fire service if plans of the building showing fire protection and escape facilities are made available.

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Section 8. Advice for owners and occupiers of flats and maisonettes

Management is now dealt with in BS 5588-12.[5)]

[5)] *Footnote deleted*

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Appendix A
Bibliography

A.1 Advice to occupiers on precautions against fire

Home Office, Scottish Home and Health Department and Northern Ireland Office (obtainable from local fire stations):

Danger from fire

Danger from fire, how to protect your home

Fire safety in high rise flats. How to prevent fires.

What to do if fire breaks out

Smoke alarms in the home[6)]

Your home fire safety guide

Fire extinguishers for the home

Fire Protection Association, 140 Aldersgate Street, London, EC1A 4HX:

Check list for fire safety in the home

Fire in your home ...

A.2 Technical publications

Department of Environment Building Research Establishment Current Papers, Building Research Establishment, Watford, WD2 7JR:

CP 51/77 Fires in dwellings — an investigation of actual fires. Part I: Hazards due to ceiling and roof construction. A Silcock, N P Savage and D Robinson. October 1977.

CP 80/78 Fires in dwellings — an investigation of actual fires. Part II: Hazards from ground-floor fires; Part III: Physiological effects of fire. A Silcock, D Robinson and N P Savage. December 1978.

CP 9/81 Fires in dwellings — an investigation of actual fires. Part IV: Fires in BISF houses. A Silcock. December 1981.

The Fire Protection Association, 140 Aldersgate Street, London, EC1A 4HX also publishes information on fires in dwellings.

Appendix B

Appendix deleted.

[6)] The text of "Smoke alarms in the home" is reproduced as Appendix D.

Appendix C
Development of fire

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 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. When the smoke layer extends down to head height it will produce discomfort to the eyes and difficulty in breathing, both of which will interfere with the efforts of occupants to find their way towards the exits. People who are prevented from escaping by dense smoke, or who are unduly retarded from escaping by it, may suffer from the toxic effects of the products of combustion that accompany the smoke and the asphyxiant effect caused by lack of oxygen. Intoxication, incapacity, unconsciousness and possibly death may result. These considerations are particularly important when dealing with persons who may vary widely in age and degree of mobility.

As the fire grows in area, the flames spread 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.

The effects of the fire may not always be confined to the space in which it originated. If the enclosing walls do not form a fire-tight joint with the floor (or ceiling) above, where the attack from the flames or hot gases is most severe, the fire will soon penetrate 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 they 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.

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Appendix D
Smoke alarms in the home

This appendix consists of the text of booklet FB2 "Smoke Alarms in the Home", 1988, reproduced by permission of the Home Departments.

NOTE Copies of this and other fire safety literature produced by the Home Office/Scottish Home and Health Department/ Northern Ireland Office are available from local fire authorities.

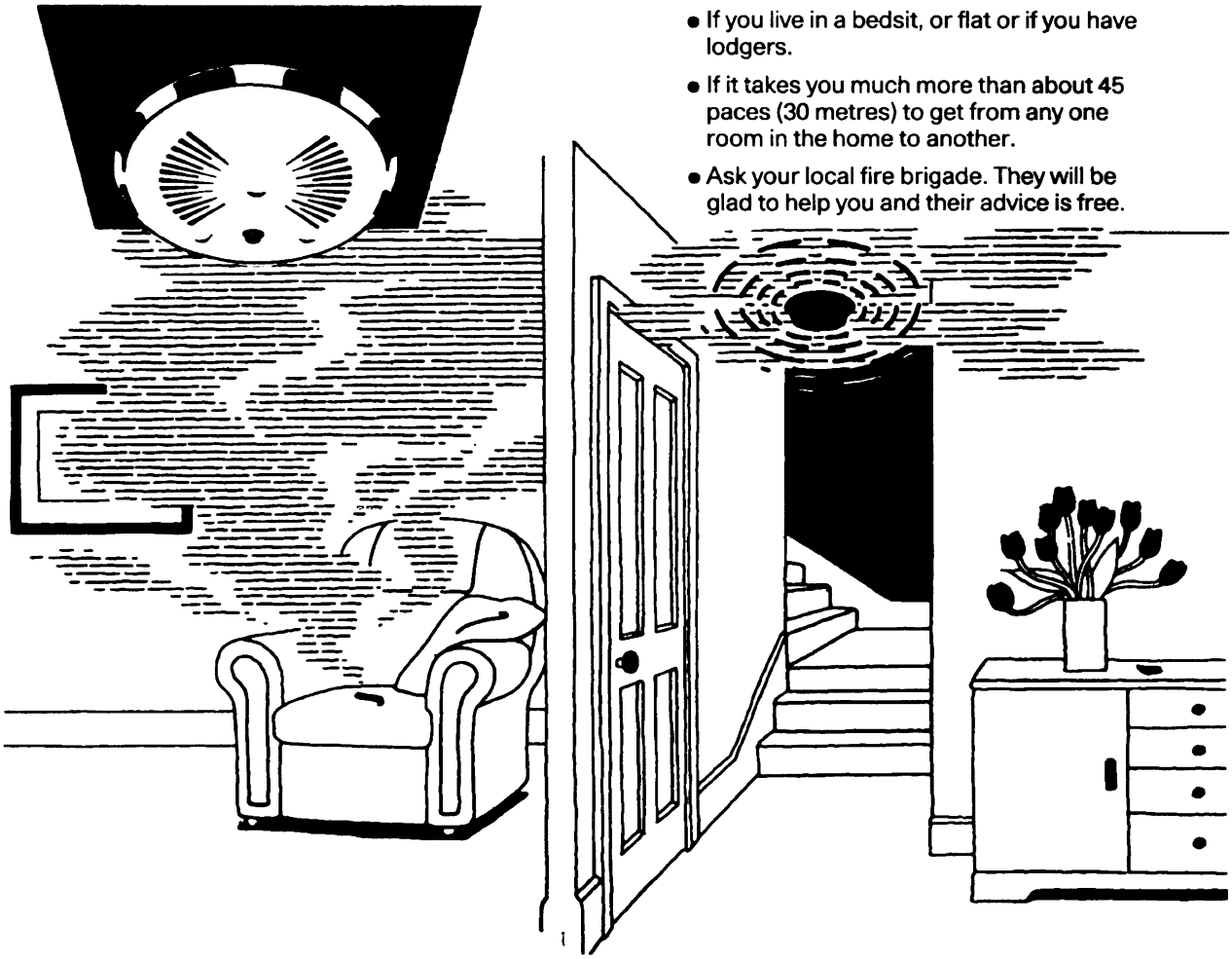
SMOKE ALARMS IN THE HOME

ABOUT THIS BOOKLET

If you are reading this booklet you are probably thinking about buying a smoke alarm for your home or may have already bought one. This booklet tells you how smoke alarms work and how to get the best from them for your safety. It covers the main types of smoke alarm on the market for use in the home and the various kinds of homes for which they are suitable.

The guidance given in this booklet is for the average family home. You may need special advice

- If you live in a bedsit, or flat or if you have lodgers.
- If it takes you much more than about 45 paces (30 metres) to get from any one room in the home to another.
- Ask your local fire brigade. They will be glad to help you and their advice is free.



THE NEED FOR EARLY DETECTION OF FIRES

No one should underrate the danger of fire. Every year, nearly 60,000 fires occur in the home in this country alone, killing about 700 people and injuring over 7,000 others. A lot of these deaths and injuries might have been prevented if only the people involved had been able to escape before it was too late. This is where smoke alarms can help. They won't stop fires starting and they can't put them out but if they are properly installed and looked after they can give you an early warning of fire and increase your chances of escape.

The longer a fire burns before it is discovered the more likely it is to cause death or injury. So a fire which starts smouldering at night when you and your family are asleep is very dangerous indeed. In fact a night-time fire is nearly three times as likely to kill as one during the day.

Some people think that the smell of smoke would wake them up. It might do. But there again it might not. And if the fire involves modern furnishings it could well be producing poisonous gases which will make sure that you never wake up. Even if the smoke did wake you up you could well find your way out blocked by thick choking smoke.

TYPES OF DETECTOR

There are two main types of fire detector on the market.

Heat detectors

These react to increasing temperature.

Smoke alarms

These warn of fire by reacting to smoke and fumes drifting from the fire.

Smoke alarms will give you an earlier warning of most fires. Although heat detectors have their uses, they can't detect lethal amounts of smoke and poisonous gas and they need to get hot before they can operate. Smoke alarms are therefore far better for use in the home.

CHOOSING A SMOKE ALARM

DOMESTIC SMOKE ALARMS COME IN TWO BASIC TYPES

— **ionization smoke alarms**

These work by measuring the reduction of an electrical current when smoke particles enter a special chamber.

— **optical smoke alarms**

These contain a small photoelectric cell which triggers the alarm when the beam is disturbed by smoke.

Research has shown that ionization smoke alarms are often a little bit quicker to react to hot blazing fires than optical smoke alarms. On the other hand, optical smoke alarms seem to be better at detecting smouldering fires of the sort that might be started by a cigarette having fallen down the back of a sofa or chair (as shown at the beginning of this leaflet). There isn't a lot to choose between the two types of smoke alarm but if you are concerned about smouldering fires you should make sure that you buy an optical type.

NOTE Some smoke alarms on the market combine both optical and ionization devices in a single unit. These "dual" detectors can give you a better all round performance if the two devices have been connected in such a way that only one needs to trigger before the alarm sounds (usually a piercing, high-pitched, continuous bleep). If in doubt consult your supplier or fire brigade.

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SMOKE ALARMS CAN BE POWERED

- by batteries in the unit
- from the mains electrical supply
- from the mains, but with a standby battery so that alarms will operate even if the mains supply fails.

The last of these is the most reliable method. The first method (which probably accounts for the majority of devices readily available on the domestic market) is acceptable provided you are prepared to look after the equipment properly. The second method is also acceptable if your mains electrical supply is reliable.

If you choose a smoke alarm powered by battery alone

✔ Remember to change the battery at least once a year or sooner if your model gives its special low battery signal (usually an intermittent electronic bleeping sound).

✔ Remember to check that your smoke alarm is working when you've been away from home for more than a few days (you might have missed the low battery signal).

If you choose a smoke alarm powered from the mains

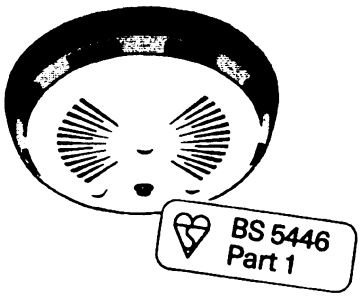
✔ Have it fitted by a competent electrician.

✔ Make sure that the mains supply is permanently connected and can't be switched off by mistake.

✘ Don't use extension cables to reach a distant socket or try to fix a cable from a lamp or adaptor.

BUY WISELY

Whatever type or make of smoke alarm you buy, make sure it meets British Standards and has the BS number BS 5446-1 on it. If the smoke alarm has the Kite Mark on it too, so much the better.[7)]



[7)] There is also a British Standard Code of Practice covering the installation and servicing of fire detection and alarm systems in buildings — BS 5839-1. This Code of Practice is mainly intended for hotels, factories and the like, but it can cover private houses as well. If your home is large (see page 3) or if you want your fire alarm system to contact the fire brigade automatically it is strongly recommended that you follow the Code of Practice.

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IS ONE SMOKE ALARM ENOUGH?

In many ways this is a more important question than which kind of smoke alarm to buy. In order to do its job properly a smoke alarm needs to be close enough to the fire to respond quickly but in a position where its alarm can be heard throughout your home and is able to wake you and your family — **in time for you all to escape.** A single smoke alarm will give some protection if it is properly installed (see the next section on where to place your smoke alarms) but obviously two or more offer more reliable early warning than one and are more likely to provide an adequate amount of time for you all to escape. **For maximum protection** you should put individual smoke alarms in all the rooms where fire is most likely to break out.

If you can afford only one or two smoke alarms, try this simple test. Decide on the quickest and safest route you and your family would use to escape through the house from a fire which started in your living room at night. Now get someone to stand holding a smoke alarm on that route as close to the living room door as possible but not more than ten paces away from any other door to living accommodation or the kitchen. Ask them to wait for a few minutes and then start the alarm (the maker's instructions should tell you how to do this). In the meantime close your bedroom door, set a radio to a reasonably loud conversation level and lie on your bed. Can you hear the alarm? If you can't hear it over your radio the chances are that it wouldn't wake you. To make sure you are woken up you need extra detection and alarm facilities and the simplest way of doing this is to link another smoke alarm to the first, putting one in the best position to detect the fire and the other in the best position to be heard. In this way if one smoke alarm senses smoke both will sound an alarm and provide a louder warning. Linking a battery model should be a simple operation for an electrician or reasonably competent DIY householder but the maker's instructions should be followed carefully.

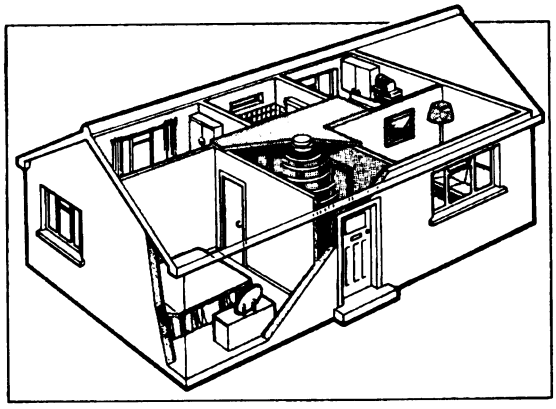
Even if you install only one smoke alarm to start with, it is worth thinking about buying a model which can be linked to others. Then, when you can afford to buy more smoke alarms or when circumstances change, such as the addition of young children to the family, more smoke alarms can easily be added and linked to the first.

NOTE Not all self-contained smoke alarms are suitable for linking with others and you should check with your supplier that the one you are buying is suitable for linking in this way.

WHERE IS THE BEST PLACE FOR SMOKE ALARMS?

This depends on the size and layout of your home and where you and your family sleep. The most critical requirement for the positioning of a **single** smoke alarm is to choose a spot between the sleeping area(s) and the most likely sources of fire (living room or kitchen). But it shouldn't be more than about 10 paces (seven metres) from the door to any room where a fire might start and block your escape from the house.

If your home is on one level (a bungalow or mobile home for example) you should put your smoke alarm in a corridor or hallway between the sleeping and living accommodation. Place it as near to the living accommodation as possible but make sure you can hear it loudly enough to wake you in the bedroom.



Where there are rooms (other than a bathroom or WC) on either side of a bedroom, a single smoke alarm should be sited on the ceiling in the hall or corridor midway between the doors to those rooms.

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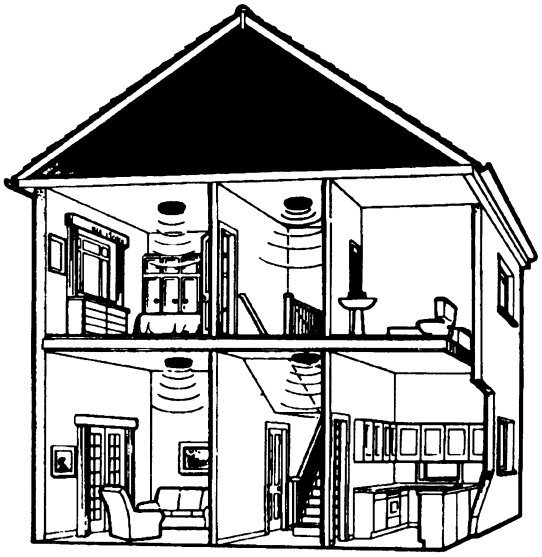
NOTE If your bungalow is very large and the corridor or hallway is more than, say, 22 paces (15 metres) long, one smoke alarm may not be enough and you should consult your local fire brigade.

If your home is on more than one level the best place for a **single** smoke alarm is in the hallway above the bottom of the staircase. This is because smoke is likely to be detectable in the hallway before it reaches the upstairs landing and bedrooms. But if you can't hear the alarm properly in the bedrooms (try the test described earlier) you'll need to link another smoke alarm on the landing. It is a good idea to do this anyway because smoke from a fire **in a bedroom upstairs** is unlikely to be detected by a smoke alarm downstairs.

If you're putting in several smoke alarms and you've put one (or two) between the sleeping area(s) and living accommodation as described above, you should put the other smoke alarms in the individual rooms where fire is most likely to occur. The living room is the most likely place for a fire to start at night, then the kitchen (although it's **not** recommended to put smoke alarms in kitchens — put one outside the cooking area instead) and lastly the dining room. You should also consider putting smoke alarms in any bedrooms where fires might be likely to start, for instance, where there is an electrical appliance such as an electric blanket or an electric heater, or where the occupant is a smoker. You could also consider putting smoke alarms in any rooms where the occupant may not be able to respond very well to a fire starting in the room, such as an elderly or sick person or a very young child.



SOME DOs AND DON'Ts ON POSITIONING SMOKE ALARMS

✔ Do make sure your smoke alarm is fixed on the ceiling at least 30 cm (12 inches) from any wall or light fitting. A central position is best. If it's designed for wall mounting, put it between 15 and 30 cm (6 and 12 inches) below the ceiling.

✔ Do put your smoke alarm where you will be able to reach it fairly easily — and safely — for regular testing and maintenance; not above stairwells, for example.

✘ Don't put your smoke alarm in any room which tends to get very hot (a boiler room for example) or very cold (an unheated outhouse).

✘ Don't put your smoke alarm in bathrooms, shower rooms or in cooking areas or garages where the smoke alarm may be triggered by steam, condensation or fumes.

✘ Don't put your smoke alarm next to or directly above heaters or air conditioning vents.

✘ Don't fix your smoke alarm to surfaces which are normally much warmer or colder than the rest of the room. These can include uninsulated exterior walls and ceilings (temperature differences might stop smoke from reaching it).

LOOKING AFTER YOUR SMOKE ALARM

All smoke alarms need to be checked regularly to make sure they are in good working order. First you should make sure that the smoke alarm is powered (see under "Choosing a smoke alarm"). Then you need to make sure that your smoke alarm will sense smoke properly. A smoke alarm which has been made to the British Standard should come with instructions on how to do this. One test is to allow the smoke from a joss-stick or newly-extinguished taper to drift up to the smoke alarm from immediately below it. As soon as the alarm sounds, fan the smoke away vigorously to silence it. You should give your smoke alarm a proper test once a month.

For periodic maintenance and servicing, follow the maker's instructions.

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BE PREPARED

If you have followed the advice in this booklet you should have a smoke alarm system which is capable of giving you and your family warning of a fire before it spreads. This will give you a better chance of escaping unharmed. The amount of warning will obviously depend on the fire, the equipment you have chosen and how well you have looked after it. However, you may only have a few minutes to escape so it pays to have made an escape plan in advance. Everyone, including children, should know what to do in case of a real fire.

- Practise walking along your main escape route with your family. You may all have to do it **in the dark** under very unpleasant conditions.
- Plan other **safe** ways of escaping from your home if your main route was blocked by fire or smoke.

WHAT TO DO WHEN THE ALARM GOES OFF...

- Alert the household and get everyone out by the safest route. If you have to go through a smoke-filled area crawl with your head low.
- If it's safe to do so, shut doors and windows to help reduce draughts that could fan the fire. Feel each door before opening it — if it is warm or if smoke is coming through **don't open it** — it could be protecting you from a dangerous smouldering fire.
- Alert the neighbours and call the fire brigade as soon as possible (don't leave it to somebody else) giving the full address of the fire.
- Make sure everyone stays outside the house until the fire brigade arrives and tells you it's safe to go back in. Possessions are replaceable — people are not.

WHAT ABOUT FALSE ALARMS?

If, when the alarm goes off, there is no sign of smoke or heat or noise to indicate that there is a fire you should get your family into a place from where escape is easy **before you start investigating.** If you feel any signs of heat at the top of any door **don't open it.** If the alarm has gone off without apparent cause it may be an indication that the battery in the smoke alarm needs replacing. Other causes of false alarms are fumes, steam, dust and even small insects inside the detector chamber.

NOW...

Read the booklet *Your Home Fire Safety Guide* (available from your local fire brigade). It contains a lot of useful information on how to prevent fires happening. Make sure in particular that every member of your family understands the need to keep downstairs doors shut at night. There is also a companion booklet *Fire Extinguishers for the Home* available.

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Publications referred to

BS 476-4, *Fire tests on building materials and structures — Part 4: Non-combustibility test for materials.*

BS 476-8, *Fire tests on building materials and structures — Part 8: Test methods and criteria for the fire resistance of elements of building construction.*

BS 476-11, *Fire tests on building materials and structures — Part 11: Method for assessing the heat emission from building materials.*

BS 476-20, *Fire tests on building materials and structures — Part 20: Method for determination of the fire resistance of elements of construction (general principles).*

BS 476-21, *Fire tests on building materials and structures — Part 21: Methods for determination of the fire resistance of loadbearing elements of construction.*

BS 476-22, *Fire tests on building materials and structures — Part 22: Methods for determination of the fire resistance of non-loadbearing elements of construction.*

BS 476-23, *Fire tests on building materials and structures — Part 23: Methods for determination of the contribution of components to the fire resistance of a structure.*

BS 476-31.1, *Fire tests on building materials and structures — Part 31: Methods for measuring smoke penetration through doorsets and shutter assemblies — Section 31.1: Method of measurement under ambient temperature conditions.*

BS 799-5, *Oil burning equipment — Part 5: Specification for oil storage tanks.*

BS 3632, *Specification for park homes (mobile homes).*

BS 4211, *Specification for ladders for permanent access to chimneys, other high structures, silos and bins.*

BS 4467, *Anthropometric and ergonomic recommendations for dimensions in designing for the elderly.*

BS 5041-1, *Fire hydrant systems equipment — Part 1: Specification for landing valves for wet risers.*

BS 5041-2, *Fire hydrant systems equipment — Part 2: Specification for landing valves for dry risers.*

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

BS 5274, *Specification for fire hose reels (water) for fixed installations.*

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

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

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

BS 5395, *Stairs, ladders and walkways.*

BS 5410-1, *Code of practice for oil firing — Part 1: Installations up to 44 kW output capacity for space heating and hot water supply purposes.*

BS 5410-2, *Code of practice for oil firing — Part 2: Installations of 44 kW and above output capacity for space heating, hot water and steam supply purposes.*

BS 5423, *Specification for portable fire extinguishers.*

BS 5446-1, *Components of automatic fire alarm systems for residential premises — Part 1: Specification for self-contained smoke alarms and point-type smoke detectors.*

BS 5499-1, *Fire safety signs, notices and graphic symbols — Part 1: Specification for fire safety signs.*

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

BS 5588-5, *Fire precautions in the design, construction and use of buildings — Part 5: Code of practice for firefighting stairs and lifts*[8].

[8] *Footnote deleted*

BS 5588-8, *Fire precautions in the design, construction and use of buildings — Part 8: Code of practice for means of escape for disabled people.*

BS 5588-9, *Fire precautions in the design, construction and use of buildings — Part 9: Code of practice for ventilation and air conditioning ductwork.*

BS 5588-12, *Fire precautions in the design, construction and use of buildings — Part 12: Managing fire safety.*

Text deleted.

BS 5655, *Lifts and service lifts.*

BS 5720, *Code of practice for mechanical ventilation and air conditioning in buildings.*

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

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

BS 5852, *Fire tests for furniture.*

Text deleted.

BS 5906, *Code of practice for storage and on-site treatment of solid waste from buildings.*

BS 6180, *Code of practice for protective barriers in and about buildings.*

BS 6262, *Code of practice for glazing for buildings.*

BS 6387, *Specification for performance requirements for cables required to maintain circuit integrity under fire conditions.*

BS 6400, *Specification for installation of domestic gas meters (2nd family gases).*

BS 6459-1, *Door closers — Part 1: Specification for mechanical performance of crank and rack and pinion overhead closers.*

BS 6575, *Specification for fire blankets.*

BS 6644, *Specification for installation of gas-fired hot water boilers of rated inputs between 60 kW and 2 MW (2nd and 3rd family gases).*

BS 6798, *Specification for installation of gas-fired hot water boilers of rated input not exceeding 60 kW.*

BS 6804, *Code of practice for social alarm systems.*

BS 6891, *Specification for installation of low pressure gas pipework of up to 28 mm (R1) in domestic premises (2nd family gas).*

BS 7036, *Code of practice for provision and installation of safety devices for automatic power operated pedestrian door systems.*

Text deleted.

BS 8214, *Code of practice for fire door assemblies with non-metallic leaves*[9].

BS 8300, *Design of buildings and their approaches to meet the needs of disabled people — Code of practice.*

BS 8313, *Code of practice for accommodation of building services in ducts.*

PD 6512-1, *Use of elements of structural fire protection with particular reference to the recommendations given in BS 5588 "Fire precautions in the design and construction of buildings" — Part 1: Guide to fire doors.*

PD 6512-2, *Use of elements of structural fire protection with particular reference to the recommendations given in BS 5588 "Fire precautions in the design and construction of buildings" — Part 2: Examples of fire doors*[10].

PD 6512-3, *Use of elements of structural fire protection with particular reference to the recommendations given in BS 5588 "Fire precautions in the design and construction of buildings" — Part 3: Guide to the fire performance of glass.*

PD 6520, *Guide to fire test methods for building materials and elements of construction.*

[9] In preparation.
[10] In preparation.

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Code of practice for hardware essential to the optimum performance of fire-resisting timber doorsets, Association of Builders Hardware Manufacturers[11].

IEE Wiring Regulations, Regulations for electrical installations, Institution of Electrical Engineers[12].

Guidance booklet HS (G) 34, Storage of LPG at fixed installations, Health and Safety Executive[13].

Guidance note CS4, Keeping of LPG in cylinders and similar containers, Health and Safety Executive[13].

Guidance note CS11, Storage and use of LPG at metered estates, Health and Safety Executive[13].

IGE/TD/4, Gas services, Institution of Gas Engineers[14].

[11]Available from Association of Builders Hardware Manufacturers, Heath Street, Tamworth, Staffordshire B77 7JH.
[12]Available from Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London WC2R 0BL.
[13]Available from HMSO, 49 High Holborn, London WC1 for personal callers, or by post from HMSO, P.O. Box 276, London SW8 5DT.
[14]Available from Institution of Gas Engineers, 17 Grosvenor Crescent, London SW1X 7ES.

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