

**BRITISH STANDARD CODE OF PRACTICE
CP 3: CHAPTER IV : Part 1 : 1971**

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**CODE OF BASIC DATA FOR
THE DESIGN OF BUILDINGS**

**CHAPTER IV
PRECAUTIONS AGAINST FIRE**

**Part 1. Flats and maisonettes
(in blocks over two storeys)**

**THE COUNCIL FOR CODES OF PRACTICE
BRITISH STANDARDS INSTITUTION**

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OF BUILDINGS

CHAPTER IV
PRECAUTIONS AGAINST FIRE

Part 1. Flats and maisonettes
(in blocks over two storeys)

Incorporating amendments issued January 1972 (AMD 851),
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PRECAUTIONS AGAINST FIRE

PART 1. FLATS AND MAISONNETTES (IN BLOCKS OVER TWO (STOREYS))

This part of the Code of Practice has been prepared by a Committee convened by the Codes of Practice Committee for Building. Having been endorsed by the Council for Codes of Practice, it was published under the authority of the Executive Board on 29th October, 1971.

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This Code of Practice makes reference to the following British Standards:

- BS 336. Fire hose couplings and ancillary equipment.
- BS 476. Fire tests on building materials and structures.
- BS 799. Oil burning equipment.
- BS 1227. Hinges.
Part 1A. Hinges for general building purposes.
- BS 2655. Lifts, escalators, passenger conveyors and paternosters.
Part 1. General requirements for electric, hydraulic and hand-powered lifts.
- BS 3300. Kerosine (paraffin) unflued spaceheaters, cooking and boiling appliances for domestic use.
- BS 3980. Boxes for foam inlets and dry risers.
- BS 4422. Glossary of terms associated with fire.
Part 1. The phenomenon of fire.
- CP 3. Code of basic design data for the design of buildings.
Chapter IV. Precautions against fire.
Part 2. Shops and departmental stores.
Part 3. Office buildings.
- CP 153. Windows and rooflights
Part 4. Fire hazards associated with glazing in buildings.
- CP 306. The storage and collection of refuse from residential buildings.
- CP 331. Installation of pipes and meters for town gas.
Part 2. Metering and meter control.
- CP 332. Selection and installation of town gas space heating.
Part 1. Independent domestic appliances.
Part 2. Central heating boilers for domestic premises.
Part 3. Boilers of more than 150 000 Btu/h (44 kW) and up to 2 000 000 Btu/h (586 kW) output.
Part 4. Ducted warm air systems.
- CP 407.101. Electric lifts for passengers, goods and service.
- CP 3002. Oil firing.
- CP Suspended ceilings and linings of dry construction using metal fixing systems (in course of preparation).

British Standard Codes of Practice are revised, when necessary by the issue either of amendment slips or of revised editions. It is important that users ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this Code of Practice:
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PRECAUTIONS AGAINST FIRE

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This Code of Practice represents a standard of good practice and takes the form of recommendations: compliance with it does not confer immunity from relevant legal requirements including regulations and byelaws.

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CHAPTER IV

PRECAUTIONS AGAINST FIRE

Part 1. Flats and maisonettes (in blocks over two storeys)

FOREWORD

The object of this Code is to provide that in the planning of new flats and maisonettes in blocks over two storeys in height, adequate safeguards are introduced to protect the lives of occupants in the event of fire. The difficulty of making comprehensive recommendations capable of covering every possible risk should be appreciated and an intelligent application of the principles and the recommendations which follow is therefore essential.

This Code supersedes CP 3, 'Code of basic data for the design of buildings', Chapter IV, 'Precautions against fire', Part 1, 'Fire precautions in flats and maisonettes over 80 ft in height'.

It has become apparent, and generally agreed, that external rescue by the Fire Service may not always be possible from blocks of flats and maisonettes, even when the dwellings are within reach of escape ladders. Modern traffic conditions and congestion, as well as parking around blocks, may delay the attendance of the fire brigade; furthermore, reliance on such appliances as manipulative types of escapes or mobile ladders is considered to be unsatisfactory. Also, the assumption should no longer be made that entire buildings, whole floors, or even adjoining dwellings need to be evacuated if a fire occurs. Owing to the high degree of compartmentation provided in dwellings in modern blocks, the spread of fire and smoke from one dwelling to another and the need to evacuate the occupants of adjoining dwellings are unusual. The occupants should be safe if they remain where they are. Nevertheless, the possibility that individuals may seek to leave the building cannot be overlooked and provision should therefore be made for the occupant of any dwelling to do so by his own unaided efforts, using adequately protected escape routes within the building without outside assistance.

Once the principle of rescue by the fire brigade is discounted, it becomes apparent that there is no reason for a substantially different Code of Practice applying to buildings below 24 m (approximately 80 ft) in height, compared with those above 24 m (approximately 80 ft) in height; hence the publication of this 'combined' Code of Practice, which it is intended will apply to all flats and maisonettes above the first floor in blocks of any height. (One and two storey dwellings entered at ground level from outside a block, that is, not through a main stairway or shared circulation space, are excluded.) One problem in drafting this Code has been the widely varying requirements that have been applied to buildings of different heights in the past. The committee has therefore attempted to achieve a balance between those many standards, bearing in mind the latest developments in methods of achieving life safety.

The committee has taken a positive view in the new Code. It is seen as a step forward in providing for life safety by presenting under one cover a Code for all flats and maisonettes. The Code is presented as a companion volume to Part 2, 'Shops and departmental stores', and Part 3, 'Office buildings', recently published, and its appearance at this time has provided a valuable opportunity to incorporate some new ideas. A choice is now available to the designer of flats and maisonettes as to the system he may adopt for the protection of escape routes. The choice is based on the principles of smoke control and smoke dispersal, either by natural cross ventilation or by mechanical means. This should allow greater design flexibility and, if smoke dispersal is adopted, increased travel distances compared with those previously recommended in CP 3 : Chapter IV : Part 1. (In certain cases the use of a combination of permanent and openable ventilation, or automatically controlled ventilators, is also recommended.)

Because of the wide variety of block types to which the Code will be applicable, the aim has been to make the recommendations as straightforward as possible and to discuss the principles in detail so that designers, local authorities and fire authorities will be able to apply the Code with some flexibility in unusual conditions.

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The section dealing with construction is very brief. The various building regulations are comprehensive in their cover of structural fire precautions as they affect housing and very little has needed to be added to their provisions. Indeed, it has been considered advisable not to complicate the situation by causing any more reference than is necessary to two separate documents on the subject of structural fire precautions.

The Figures are intended only to clarify points made in the text. It should not be assumed that these plans are more satisfactory than others which may be devised.

The additional precautions necessary where dwellings are combined with, or are adjacent to, other occupancies such as shops, offices, large storage areas or car parks under buildings have not been fully considered. It is of course essential that there should be adequate physical separation between the two occupancies and that the means of escape from the dwellings should be designed and constructed so that under no circumstances can they be attacked by fire or smoke from the other occupancy. Consideration should also be given to the siting of blocks of dwellings in relation to other buildings and risks to ensure that the escape routes will not be endangered by a fire in an adjoining building. Advice on these points, as on other matters not covered in this and its companion Codes, can be obtained from the Building Regulation Authority and the Fire Authority, who will also advise on the practical application of the recommendations contained in this Code.

The guiding principle in the recommendations which follow is safety of life. In aiming to secure this, the Code should be applied as a whole. The most conscientious application of the 'Principles' and 'Recommendations' would be completely or partially undermined if it were not supported by the necessary measures relating to construction, ancillary accommodation, engineering services, etc., recommended in the subsequent sections.

Attention is drawn to the difference between the application of the recommendations in this Code and the obligations, as regards means of escape, imposed by legislation under the Scottish Building Regulation Standards and the London Building Acts and other local building enactments. Compliance with this Code (which is only concerned with the design of new buildings) may not necessarily secure approval for purposes of life safety under the above legislation; consultation should always take place with the enforcement authority at an early stage. Fire and water authorities should also be consulted at an early stage.

The advice to owners and occupiers of flats given in 8.2, as amended by Amendment No. 4, was originally published as Appendix B of the 'Report of the Working Group of Fire Safety in High Rise Blocks of Flats' of the Central Fire Brigades Advisory Councils for England and Wales and for Scotland. It was inserted in this Code following discussion in Parliament (Hansard, 8 March 1977, 453) when it was stated that the form of advice to occupants in BS CP 3 should be replaced by advice which the working group set out.

As added
Aug. 1978

1. GENERAL

1.1 SCOPE

This Code deals with the planning of blocks of flats and maisonettes and of individual dwellings above the first floor in blocks of any height, and makes detailed design recommendations. One and two storey dwellings entered at ground level from outside any block (that is, not through any main staircase or shared circulation space) are not included.

In this Code, Section 2, 'Planning: General principles', is to be read in conjunction with Section 3, 'Planning: Recommendations', for the design of flats and maisonettes; when applying the latter, account should be taken of relevant additional factors and qualifying remarks made under the former.

NOTE. The titles of the British Standards referred to in this Code of Practice are listed on page 2.

1.2 DEFINITIONS

For the purposes of this Code the following definitions apply:

<i>Adjoining dwelling</i>	A dwelling either adjacent to or actually adjoining a dwelling in which fire is assumed to have originated (see 'dwelling of origin' below).
<i>Alternative exit</i>	One of two or more exits from within a dwelling, each of which is separate from the other.
<i>Alternative escape route</i>	One of two escape routes from a dwelling each of which is separate from the other (usually a Stage II* condition).
<i>Balcony access; Balcony approach</i>	A design in which each dwelling is approached externally via an open balcony (which may in certain cases include a subsidiary stairway; see also 'deck access' below).
<i>Corridor access; Corridor approach</i>	A design in which each dwelling is approached via a common horizontal internal access or circulation space which may include a common entrance hall.
<i>Dead end</i>	An area from which escape is possible in one direction only.
<i>Deck access; Deck approach</i>	Similar to balcony access; a term often used to indicate a wide approach balcony which is sometimes roofed over but not enclosed (see also 'balcony access' above).
<i>Dwelling</i>	A self-contained flat or maisonette.
<i>Dwelling of origin</i>	A dwelling in which a fire has originated (see 'adjoining dwelling' above).
<i>Emergency lighting</i>	Lighting, from a separate source independent of the mains supply, which continues after failure of the normal lighting of a premises.
<i>Entrance hall</i>	Unless described as a common entrance hall, a protected hall or space within a dwelling into which the entrance and other doors open.
<i>Escape route</i>	A route forming part of the complete means of escape within a dwelling and a building, via a series of fire resisting, self-closing doors, to a place of safety.
<i>Final exit</i>	The terminal point of an escape route from a building beyond which persons are no longer in danger from fire or smoke.
<i>Fire resistance</i>	A property of an element of structure as defined in BS 4422, Part 1.
<i>Fire resisting doors (types 1 to 4)</i>	Doors with varying fire resistance, frame design and/or ironmongery, as described in 4.3.
<i>Flat</i>	A dwelling, forming part of a larger block with common access, which has all its <i>habitable rooms and kitchen</i> on one level or, in the case of 'split level' flats, not more than half a storey height apart.
<i>Landing</i>	A circulation space, generally inside a dwelling, at the head, foot, or intermediate stage of a stairway, off which rooms may be entered.

* See 2.1.1.3

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<i>Linking balcony</i>	An arrangement which provides alternative access in an emergency to an adjoining place of safety via an external balcony, usually between two dwellings.
<i>Lobby</i>	Unless described as a 'stairway protection lobby' (q.v.), a similar function and meaning to 'corridor' except that 'lobby', by common usage, refers to a smaller space of compact shape.
<i>Maisonette</i>	A dwelling, forming part of a larger block with common access, which has its <i>habitable rooms and kitchen</i> divided between two or more levels which are more than half a storey height apart.
<i>Means of escape</i>	Structural means whereby a safe route, or routes, is provided for persons to travel from any part of a building to a place of safety by their own unaided efforts.
<i>Non-combustible</i>	A property of a building material as defined in BS 4422, Part 1.
<i>Place of safety</i>	A place in which persons are in no danger from fire.
<i>Protected circuit</i>	An electrical sub- or main circuit, protected against fire and exclusively serving fire lifts and stairway or corridor lights.
<i>Self-closing, fire resisting door</i>	A fire resisting door fitted with a device which fully closes the door overriding the resistance of any latch.
<i>Stairway, main</i>	A common stairway which forms part of a vertical escape route finally leading to the outside of a building at podium or ground level.
<i>Stairway, protected</i>	A stairway protected from the remainder of a building by fire resisting construction, accessible only through self-closing, fire resisting doors and forming the vertical component of a protected escape route.
<i>Stairway protection lobby</i>	A lobby which is provided to give protection to a stairway from the entry of smoke and gases from a fire at that level and which has either permanent or openable ventilators or windows.
<i>Stairway, single</i>	A main stairway which is the only one to which dwellings in a block of flats or maisonettes have access.
<i>Stairway, subsidiary</i>	A stairway, not a main stairway, which serves a number of dwellings off a horizontal access route and which may be regarded as an extension of that route and which does not discharge outside the building at podium or ground level.

2. PLANNING: GENERAL PRINCIPLES

NOTE 1. This section should be read in conjunction with Section 3; the numbers of corresponding clauses are shown in square brackets.

NOTE 2. Figures are intended only to clarify points made in the text; it should not be assumed that these plans are more satisfactory than others which may be devised.

2.1 GENERAL

It is no longer assumed that when a fire occurs in a block it is necessary to evacuate the whole block, whole floors or even dwellings adjacent to the fire. In an emergency, however, the occupants of dwellings would generally first try to escape from a fire by the most obvious route in order to reach safety before being cut off by smoke and hot gases. Where escape routes are adequately protected, safety may be reached within the building, or in the open air clear of the building, by the occupants' own unaided efforts and without reliance on rescue by the fire service.

2.1.1 Analysis of the problem

2.1.1.1 The only sound basis for designing means of escape from fire is to attempt to locate the position of all possible sources of any outbreak of fire and to predict the courses which might thereafter be followed by the

fire as it develops or, more particularly, the routes which smoke and hot gases are likely to take. Only against this background is it possible to design and protect escape routes with some certainty that they will be safe.

2.1.1.2 The approach described in **2.1.1.1** is fundamental. This Code makes recommendations in terms of the number of exits, travel distance, protection of escape routes, etc., and it may, by the way in which these recommendations are drafted, provide some guidance on design principles, but it is impossible to make specific recommendations showing how to avoid, or minimize, all possible risks. An intelligent use of the recommendations is essential, but this is possible only if an attempt is made to identify the likely points of origin of fire and to anticipate its subsequent behaviour.

2.1.1.3 For the purposes of this Code escape routes are considered in three stages: in Stage I, the risk is to the occupants of the dwelling in which the fire originates; in Stage II, the risk is to the occupants of adjoining dwellings if smoke or fire should penetrate to the horizontal escape route (the common corridor, or balcony or approach to a subsidiary stairway); in Stage III, the risk is mainly to the occupants of dwellings on floors above the floor of outbreak if smoke or hot gases should penetrate to the vertical escape route (the common stairway) or to the horizontal escape route from the foot of the stairway to the open air.

2.1.1.4 It should be emphasized that although the recommendations of this Code do not apply to ground and first floors, no variation of these floors, compared with those above, should be permitted which would in any way reduce the safety of the occupants of the upper floors. This would not affect the requirements of Stage I but, in Stage II and, particularly, in Stage III, protection afforded to the stairway should not be reduced on the lower floors.

2.2 STAGE I

2.2.1 General

2.2.1.1 Most serious accidents and fatalities occur in rooms in which a fire originates.

2.2.1.2 Fires occurring in kitchens or living rooms (particularly when unoccupied) are a major threat to safety as they may develop to serious proportions whilst occupants are asleep in their bedrooms. This is a much greater risk in maisonettes than it is in most flats, because smoke and hot gases rise more rapidly than they spread horizontally; but the risk is not a negligible one in flats, even where all the bedrooms open out of the entrance hall; where the bedrooms are entered through the living room (as in the case of bed-sitting rooms) the risk is at least as great as it is in maisonettes.

2.2.1.3 The incidence of fires in bedrooms has increased in number during recent years. Fires have developed in unoccupied rooms to an extent which has seriously affected the means of escape in Stage I before discovery and the influence of new social habits such as television viewing (during which fires may spread rapidly before detection) add to this tendency. Recommendations are made in this Code to reduce such risks.

2.2.1.4 A fire occurring in the entrance hall or circulation space of a dwelling will be a most serious hazard if the plan is such that the only escape route from any part of the dwelling passes through it and the use therein of kerosine (paraffin) and other unfixed heaters should be strongly discouraged because of the risks they may create.

2.2.1.5 In the recommendations which follow, the acceptance of a flat having only one exit is based on the assumption that there is a protected escape route within it and that there is no appreciable fire risk in the entrance hall or circulation space. If these assumptions are not made it would be necessary for every flat to have an alternative exit from every room.

2.2.1.6 As a measure of protection in Stage II it is recommended that the entrance door of a dwelling should be self-closing and fire resisting (see **2.3.4.1**). 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 raising the alarm outside the dwelling. On the other hand, a deadlock operated only by a key could also be unsatisfactory

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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 only be locked on the outside by a key and on the inside by a manually operated bolt. Locks of this type are now generally available.

2.2.2 Flats

2.2.2.1 Two methods of providing safety are possible. One is to ensure that the escape route from any bedroom or living room to the entrance door of the flat will be via a protected entrance hall or lobby unlikely to be cut off by smoke. The other is to provide an alternative exit from the corridor or bedrooms, though the entrance hall is still required to provide protection to the Stage II escape route. [3.2.1]

2.2.2.2 To protect occupants from smoke and hot gases from a fire within a flat, and to minimize the amount of smoke which might spread to a Stage II escape route, the walls of the entrance hall, lobby or circulation space within a flat should have a prescribed minimum standard of fire resistance. All rooms (other than bathrooms and w.c.'s containing no fire risk) opening off the hall, lobby or circulation space should be fitted with self-closing, fire resisting doors (cupboard doors need not be self-closing). The hall, lobby or circulation space should not contain any likely source of fire. [3.2.1.1]

2.2.2.3 If reliance is to be placed on escape via the entrance hall or circulation space, all bedroom and living room doors should open out of the hall and bedroom doors should preferably be nearer to the exit door from the flat (i.e. the normal entrance door) than are the doors of kitchen and living rooms (see Fig. 1). The travel distance from the door of any bedroom to the entrance door (or, where the flat is entered from the floor below, to the head of the private stairway) should be limited (see Figs. 2 and 4). [3.2.1.1]

[3.2.2.2]

2.2.2.4 Where the arrangement of the living rooms and bedrooms does not comply with the recommendations given in 2.2.2.3, or where the entrance to the flat is via a private internal stairway from a floor above, an alternative exit should be provided (see Figs. 2, 3 and 5). [3.2.2.3]

2.2.3 Maisonettes

2.2.3.1 Many arrangements of maisonette are possible. Designs vary from the most common type which is approached from a common open balcony or deck, with living rooms at entrance level and bedrooms directly over on the floor above, to complex cross-over interlocking forms extending through two or more floors with living rooms, kitchens and bedrooms on any floor (see Figs. 6, 7A to 7E).

2.2.3.2 Because of the generally greater hazard in a maisonette compared with that in a flat it is essential to provide:

(1) a private entrance hall and (except in certain 'open plan' maisonettes) a stairway therein, with no fire risk; living rooms and bedrooms should have direct access to the hall or a landing without passing through another room;

(2) an alternative exit (or exits) from any floor with habitable rooms other than the entrance floor;

(3) protection of internal escape routes against fire and smoke.*

[3.2.3]

2.2.3.3 All entrance halls and, except where each bedroom on a level above the entrance floor is provided with an alternative exit (see Fig. 7A(i)), all landings should be protected from the effects of fire and hot gases. The enclosing walls of entrance halls, landings and circulation spaces should have a prescribed minimum standard of fire resistance and all doors opening on to these circulation areas (except those of bathrooms and w.c.'s with no fire risks) should be self-closing and fire resisting (see Figs. 7A to 7D). Cupboard doors need not be self-closing but should be kept shut. [3.2.3]

2.2.3.4 To reduce the risk to occupants on any upper floor within a maisonette, floors on which habitable rooms are located should be separated from each other by fire resisting screens and doors at the head or foot of a stairway and/or intermediate landing, except:

* Advice will shortly be available on the location and use of warm air heating units.

(1) where bedrooms are not located at entrance level, where they are provided with more than one alternative exit and where the need to cross the landing has been eliminated either by the use of pass-doors between bedrooms or by bedroom doors being within a limited travel distance of each other (see Figs. 7A(i), 7A(iii), 7B(i) and 7B(iii)); or

(2) where bedrooms are at entrance level and the living room and kitchen are on the floor above (see Fig. 7C(i)); or

(3) where each bedroom has its own independent alternative exit (see Figs. 7A(i) and 7E). [3.2.3]

2.2.3.5 There are various acceptable ways of providing alternative exits. One method is the provision of a balcony which leads to a place of safety (see Fig. 17). Another method is to provide a private stairway leading up or down to a main corridor or public access area on another floor from which safe escape may be made (see Fig. 6). Such a stairway will, however, penetrate a main floor, thus introducing a risk that fire might spread from one floor to another. It is particularly important that the stairway should be adequately protected against such a risk. The risk is much reduced if the stairway leads downwards rather than upwards. In both cases it remains necessary to assure safety in Stage II. [3.2.3]

2.2.3.6 Open planning arrangements are in certain cases acceptable. Special consideration should be given to the merits of each particular design and to the foregoing principles (see Fig. 7E). [3.2.3.4]

2.3 STAGE II

2.3.1 General. This stage is concerned with the safety of occupants using the horizontal escape routes, i.e. those which lead from the exit of an individual dwelling to a main stairway. The aim should be to ensure that a fire which starts in any one dwelling will not obstruct the escape of the occupants of any other dwelling on the same, or adjoining, floor. Since the normal escape route is identical with the approach route, the problem is related to the three types of approach, namely, by an external balcony or deck, by a subsidiary stairway leading from an external balcony or deck and by an internal corridor.

2.3.2 Dwellings with balcony or deck approach. Although there is little risk with this type of approach that fire will spread from one dwelling to another dwelling which adjoins it or that smoke from a fire will cover more than a short length of the balcony, there is some risk that the part of the balcony which adjoins a dwelling which is on fire may at some time become impassable due to flames, smoke or hot gases issuing from a door or window opening. In order to reduce these risks, where the escape route from any dwelling leads in one direction only to a main stairway, a specified height of external wall of any dwelling abutting the balcony should be constructed to a prescribed minimum of fire resistance so that persons may be able to crawl past the dwelling on fire with some measure of protection; the travel distance should also be limited to that required by the fire service for fire-fighting access (see Fig. 9; also see 7.1.4 and 7.3.1). If escape is possible in two directions (Figs. 8 and 10), the risk that both will be rendered impassable by smoke will be negligible and travel distance should be restricted only by the requirements of the fire service for fire fighting access and special protection of external walls will be unnecessary. Where these recommendations are not adopted, an alternative escape route from each dwelling should be provided independent of the common balcony. [3.3.1]

2.3.3 Dwellings with entrance doors opening indirectly off a balcony or deck via a subsidiary stairway. It is important to appreciate the distinction between subsidiary and main stairways. A main stairway provides a vertical escape route to the ground or to the base of a block at podium level; a subsidiary stairway, on the other hand, serves only as an access to a limited number of dwellings entered from a floor above or below a balcony or deck to which it is regarded as an extension. To prevent the subsidiary stairway becoming smoke-logged it should be permanently ventilated at the head and should not be enclosed at balcony or deck level by a door. Weather protection should be provided to prevent ice forming and snow falling on to the stairway. No dwelling should have access to the subsidiary stairway at balcony or deck level. [3.3.2]

Restrictions imposed on the horizontal escape route between the subsidiary stairway and the door to a common stairway should be the same as those relating to balcony-approach dwellings (see 2.3.2 and Figs. 11 and 12). [3.3.2]

2.3.4 Smoke control: Dwellings with corridor approach

2.3.4.1 Any uncontrolled penetration of smoke to a common corridor from a dwelling which is on fire will jeopardize the escape of the occupants of other dwellings if no other route is available. This risk can be partially reduced by the increased standard of protection recommended within a dwelling for Stage I purposes and by the fitting of fire resisting, self-closing entrance doors (without glazing) to all dwellings. This Code offers designers three ways of securing a degree of protection against penetration of smoke to the common corridor from the front door of a dwelling:

(1) Smoke containment by which smoke escaping from the front doors of dwellings is contained within certain limits by smoke-stop doors across the corridor beyond which persons escaping should not be exposed to smoke. The effectiveness of the method depends on the smoke-stop doors being closed at the time of fire (see 2.3.7.1). [3.3.4.1 and 3.3.4.2]

(2) Smoke dispersal by which smoke is cleared from Stage II escape routes by natural cross ventilation. The effectiveness of the method depends on wind and temperature conditions and on ventilation openings being open permanently or opened manually or automatically at the time of fire (see 2.3.7.2 and 2.5.1(1)). [3.3.4.3]

(3) A new method of smoke control by which smoke is repelled by mechanical ventilation from pressurized areas. The effectiveness of the method depends on an adequate air supply being available at the time of fire (see 2.5.1(1)).

2.3.5 Flats with corridor approach where every dwelling is provided with an independent alternative escape route to a main stairway

2.3.5.1 The risk of smoke to occupiers in corridor-approach blocks may be reduced by the provision of an alternative escape route from each flat to a main stairway. This can be done by the addition of continuous balconies leading back to the main stairway(s) (see Fig. 17) or by carrying a stairway from each flat (see Fig. 6) or from a pair of flats, up (or preferably down) to a common corridor on another floor or up to roof level, so that occupants may reach a main stairway across the roof. In the case of a continuous balcony, it is essential that there be no risk that a fire in one flat will block the escape route from another flat to the main stairway. Where the balcony leads in one direction only to a main stairway, the external wall of any flat abutting the balcony should be constructed in accordance with the recommendation given in 2.3.2. [3.3.3]

2.3.5.2 The provision of an alternative means of escape by a linking balcony (see Fig. 17) in Stage I may not be acceptable as an alternative exit in Stage II where smoke containment has been incorporated in a horizontal escape route, if the second dwelling leads into the same section of the main approach route from which the first dwelling is entered. Should the second dwelling lead into another section of the escape route nearer to a main stairway, then a linking balcony may be permitted as an alternative means of escape in Stage II. However, because no dwelling should discharge into an escape route beyond the fire resisting door on the only route to a main stairway, advantage of this could only be taken in the case of a multi-stairway building. [3.3.3]

2.3.6 Flats with corridor approach where one flat or more is not provided with an independent alternative escape to a main stairway: General

2.3.6.1 Where an alternative exit is not provided, the risk of persons being trapped in their flats by smoke which reaches the corridor outside their flat from a fire originating in another flat will be reduced if the travel distance from any one flat exit door to a place of safety is limited. In the recommendations, a limited distance from the entrance door of a flat to a smoke-stop door opening into a place of safety has been adopted as the maximum. This is an arbitrary figure. The shorter the distance, the better, but it could not be said that a slightly greater distance would be so unsafe that it should under no circumstances be adopted. However, the maximum distance recommended should not generally be exceeded.

2.3.6.2 The place of safety may be a stairway or a lobby or corridor leading to a stairway. It should be appreciated, however, that a stairway, lobby or corridor which can itself become filled with smoke will not at

such a time be a place of safety. In other words, a place which is safe when a fire occurs in one position may not be safe if a fire occurs in a different position. Where this condition exists, it is essential that an alternative exit should be available.

2.3.6.3 The travel distance referred to in 2.3.6.1 above is devised as an escape measure and as a means of reducing to a minimum the risk that persons might be trapped on a common escape route. This risk cannot be eliminated, however, and the safety of the occupants of dwellings which are not provided with an alternative exit necessarily rests ultimately upon the protection afforded by the fire resisting, self-closing entrance and room doors mentioned in 2.2.1. One purpose of the doors is to hold back fire or smoke within a dwelling in order to keep the common escape passages clear. The doors will also serve to hold back, from entering a dwelling, fire or smoke which has reached the common escape passage from another dwelling. The occupants, therefore, should be safe if they remain in the dwellings until the fire has been extinguished. [3.3.4]

2.3.7 Flats with corridor approach where one flat or more is not provided with an independent alternative escape to a main stairway: Application

2.3.7.1 Smoke containment

2.3.7.1.1 The circumstances considered in 2.3.6.1 and 2.3.6.2 are illustrated in Figs. 21a, 21b and 22. In Fig. 21a, the place of safety is a lobby leading to a stairway, no flat exit door being further from the door separating the corridor from the lobby than the recommended maximum travel distance. In Fig. 21b, however, the lobby can become smoke-filled from a fire occurring in Flat No. 1 and will not at such a time be a place of safety for the occupants of Flats Nos. 2, 3 and 4. Under this condition it is essential that there should be an alternative exit from the corridor or from each dwelling.

2.3.7.1.2 In Fig. 22 the risk illustrated in Fig. 21b has been removed by adopting a different plan in order to provide an alternative exit. No flat exit door is more than the recommended maximum travel distance from a place of safety and, although both places of safety can become smoke-logged at different times (see Figs. 22a and 22b), the alternative exit provides safety at all times.

2.3.7.1.3 A solution which provides safety in Stage II with only one stairway but with more flats per floor than are possible with the design shown in Fig. 21a, is to open all the flats into lobbies which are permanently open to the air and which are separated by smoke-stop doors from the corridor out of which the main stairway opens (see Fig. 23). The purpose of the permanent opening to the lobby is to vent any smoke that might reach the lobby from a fire in a flat, and so reduce the risk that the smoke will penetrate the smoke-stop doors which protect the corridor. Provided the corridor is protected throughout its length in this manner, a limited length of 'dead-end' will not prove unsafe. Hence the possibility of increasing the number of flats per floor in a single stairway building. The exit doors from the flats should, of course, be arranged to comply with the principle referred to in 2.2.1 and 2.2.2. [3.3.4.2]

2.3.7.2 Smoke dispersal

2.3.7.2.1 Using the method of smoke dispersal, the place of safety will usually be a stairway because, as smoke is unlikely to attack the stairway, it is not considered necessary to have a stairway protection lobby. To ensure adequate through flow of air it is essential that the access corridor between cross-ventilation openings is not interrupted by smoke-stop doors.

2.3.7.2.2 The smoke dispersal method is illustrated in Figs. 13b, 14b, 15b, 16b and 18b. In Fig. 13b the place of safety is a stairway and the maximum travel distance between any flat exit door to the stairway enclosure door should be limited. Where escape is possible in one direction only (a 'dead-end' condition) as illustrated in Figs. 14b, 15b and 16b, it is recommended that this maximum travel distance be reduced. [3.3.4.3]

2.3.8 Maisonettes with corridor approach. The principles stated in 2.3.5 to 2.3.7 for flats apply equally to maisonettes. It will be found in practice, however, that a solution similar to that described in 2.3.5 will be the normal one because of the need to provide alternative exits from maisonettes in connection with Stage I. There is, therefore, usually no need to apply the principle of either smoke containment or dispersal to the common internal approach corridor.

2.4 STAGE III

2.4.1 General

2.4.1.1 Stage III is concerned with the safety of occupants using a main vertical escape route, i.e. a stairway (lifts cannot be considered for escape purposes, primarily because of the delay that may be experienced before a lift answers a call, the limited capacity of the lift when it arrives and the possibility of failure of the electricity supply in the event of fire).

The main objectives are:

- (1) to remove sufficiently the risk that smoke or fire might enter a stairway at any point and render it impassable above that point; and
- (2) to ensure that the escape route from the bottom of the stairway to the outside air is adequately protected.

2.4.1.2 The importance of the second of the objectives given in 2.4.1.1 is sometimes overlooked. A satisfactory ground floor plan cannot always easily be developed from a satisfactory upper floor plan and occasionally a satisfactory upper floor plan will produce problems at ground level which are incapable of solution. Upper and ground floor plans should therefore be developed together. The problems and the precautions necessary with maisonettes are the same in Stage III as with flats.

2.4.2 Main stairway arrangement and protection

2.4.2.1 The minimum protection that should be given to any stairway is to 'enclose' it, i.e. to surround it with fire resisting walls with self-closing, fire resisting access doors. As a dwelling is a likely source of fire, no dwelling (except in the conditions described in 2.4.2.5) should be entered directly from a stairway. In corridor access blocks, therefore, the corridor, and in balcony/deck access blocks the balcony or deck, should separate dwelling entrance doors from a main stairway. Similarly, and particularly in a single stairway building, no store, refuse chamber or other fire risk, such as a gas meter room, an electric intake or a cleaner's cupboard, should open directly on to a stairway. [3.4.1]

2.4.2.2 Even when the precaution outlined in 2.4.2.1 is taken, there remains some risk that smoke will enter a stairway and this risk should be countered. There are three methods:

(1) One method is to provide two stairways in a building on the assumption that smoke is unlikely to enter more than one stairway at any time. This assumption may prove false, particularly if the stairways are close together. A safeguard using smoke containment, in Stage II is to provide a smoke-stop door across the internal communicating space between the stairways so that, if a fire occurs at any point, one stairway will enjoy the protection of an additional smoke-stop door on that floor. Such a door is shown in Fig. 22. It was provided, initially, in order to meet the recommended travel distance limitation of the second stage. It will be seen however, that the same door also contributes to safety in the third stage as there will always be the protection of two smoke-stop or fire resisting doors between one of the stairways and a smoke-logged corridor (see Figs. 22a and 22b).

(2) The second and more effective method where smoke containment is adopted is to enter the stairway from a lobby which is permanently ventilated to the open air and which is itself entered only from the internal communicating space through a smoke-stop door. In this case the stairway will have the protection of two smoke-stop doors and a ventilated lobby. This arrangement is so safe that, provided the stairway enclosure has no weakness, a building with a single stairway so arranged can be regarded as having safe means of escape in the third stage. Fig. 21a illustrates such an arrangement. It will be noted that there is no requirement in Stage II for the lobby (see Fig. 21a) to have permanent ventilation, since this lobby cannot be attacked by smoke or heat in this stage and thus form a trap for those wishing to escape from the flat. Should a fire not be extinguished early, however, smoke might eventually reach the lobby and the permanent ventilation is a necessity to ensure the dissipation of smoke and heat in Stage III, as a protection to the stairway.

(3) The third method, using smoke dispersal in Stage II, is to achieve cross-ventilation in the communicating spaces leading to main stairways by means of manually operated ventilators together with either permanent openings or ventilators automatically controlled by smoke detectors.

2.4.2.3 In balcony or deck approach dwellings, where the stairway enclosure is entered from the balcony or deck, or from a corridor which is entered from the balcony, the measure of safety is equivalent to that provided by a ventilated lobby and a single stairway may again be regarded as safe in the third stage. It is essential, however, that safety in the second stage should be assured, as described earlier, and that the stairway should be enclosed and entered through smoke-stop doors on all floors. [3.4.3.1(1)]

2.4.2.4 An alternative method of protecting the stairway in a single stairway building with smoke containment is shown in Fig. 23, a design developed initially to provide adequate safeguards in Stage II. Here the arrangement described in the previous paragraphs is reversed. All the dwellings open directly into permanent ventilated lobbies and the corridor out of which the stairway is entered is itself entered only from these lobbies through smoke-stop doors. It will be observed that in this system, as in the system described in the preceding clauses, the stairway is protected by two smoke-stop doors and a ventilated lobby but that the relationship of the ventilated lobby to the stairway is different in the two systems (see Figs. 21a and 23).

2.4.2.5 In blocks not exceeding four storeys in height and served by a single stairway providing internal access for a limited number of dwellings within prescribed floor areas, relaxation of certain principles already discussed is considered reasonable and may therefore be regarded as acceptable. Because of limits imposed on the number of dwellings, their entrance doors may have access via a lobby and a self-closing, fire resisting door to the main stairway. The purpose of this lobby (which, depending on the number and sizes of dwellings it serves, may need to be ventilated) is to protect the vertical escape route so that occupants may safely pass any dwelling at a lower level endangered by fire. Where the floor areas of dwellings do not exceed the minimum prescribed limit, it is considered reasonable to assume that as the uppermost dwellings would not normally place at risk those at a lower level, therefore the upper dwellings may have direct access to the stairway. The stairway should be permanently ventilated at its head and should have openable windows at landings. [3.4.3.3]

2.4.3 Protection of main stairways: Summary. The methods of protection to stairways described in 2.4.2 can be summarized as follows:

- (1) Where there is more than one stairway serving corridors without cross-ventilation, there should be a smoke-stop door across the corridor between the doors in the enclosing walls of any two stairways.
- (2) Where there is only one stairway serving corridors without cross-ventilation, there should be a smoke-stop door across the corridor between the door in the enclosing walls of the stairway and any door covering a potential source of fire (e.g. a dwelling entrance door, refuse chamber, or door to a storage space) and at least one of the resulting spaces should take the form of a lobby which is permanently ventilated through an adjoining external wall.
- (3) Where there are one or more stairways serving corridors provided with cross-ventilation by means of manually operated ventilators, together with either permanent openings or ventilators automatically controlled by smoke detectors, a smoke-stop door only is recommended in the enclosure separating the stairway from the corridor.

2.4.4 Stairway located internally. In the recommended methods of protection to stairways provision is made in some cases, where smoke containment is used, for ventilating the common access space leading to the stairways by means of doors or windows, which can be opened where there are two stairways (see 2.5.3 and 2.5.4) or through a permanent vent in the external wall where there is only one stairway. Such ventilation may also be provided by the smoke dispersal method (see 2.5.1). Where the above provision is made, it is considered that stairways can safely be located in the interior of a building, if desired, and not necessarily on an external wall. Where they are so located they should have permanent ventilation at the top. The exits at ground floor should take the form described in 2.4.5. Any inlet air that may be necessary for the normal ventilation of the stairway can be obtained by keeping open the ground floor entrance doors. [3.4.6]

2.4.5 Protection of the escape route from the bottom of a stairway to the open air at ground or podium level [3.4.1]

2.4.5.1 On the upper floors of a building the stairway enclosure and the fire resisting, self-closing doors in the enclosure protect any occupants who may be on the stairway and passing a floor on which there is a fire. At ground or podium level, however, the direction of escape changes, becoming horizontal instead of vertical, and it is essential that the same measure of protection be given to the horizontal part of the route against a fire on the lower floor as is given to the vertical part of the route against a fire on an upper floor.

2.4.5.2 The mistake is sometimes made of adopting the same form of enclosure at ground floor as on the upper floors, i.e. of placing a door in the stairway enclosure at ground floor in a position similar to that on the upper floors. A door in this position cannot serve the same purpose on the lower floors as on the upper floors since, on the upper floors, the doors to the stairway are both a means of access to the stair and a protection to people on the stairways; but on the lower floor the door can only be a means of egress from the stairways; it cannot protect people once they have passed through it. Such an arrangement does not therefore meet the recommendation made in 2.4.5.1 that the whole of the route to the external air must be equally protected.

2.4.5.3 The mistake described in 2.4.5.2 above is illustrated in Fig. 24b which shows a possible form of ground floor arrangement for the upper floor plan shown in Fig. 24a. It is clear that the arrangement shown in Fig. 24a is satisfactory because the smoke-stop doors to the stairways protect the stairways for the benefit of all the occupants above the floor on which the fire occurs. Yet the same arrangement is not satisfactory on the ground floor under the same circumstances (see Fig. 24b) because in order to reach the exit door from the building it will be necessary for the persons on the stairway to pass from the protection of the stairway through the smoke-logged entrance corridor in order to make their escape.

2.4.5.4 Another not uncommon mistake has been to discharge two stairways through a common exit on the lower floor, e.g. into the main entrance. Whilst some means of access between the common space at ground level and at least one of the stairways will clearly be convenient, any such means of access will not necessarily provide safe means of egress from the stairway. Moreover, if stairways are linked at lower level by the common space, there may be a risk that both will be attacked by a fire commencing on the ground floor. Stairways should therefore be separated at ground floor as they are on upper floors and each stairway should have a means of egress which is independent of, and properly separated from, the means of egress from the other stairway.

2.4.5.5 The measures of protection which are necessary are summarized in 2.4.3(1). The ground floor plan illustrated in Fig. 24c meets the standard of protection recommended where there are two stairways and Fig. 21c illustrates a ground floor plan which is suitable for the upper floor plan shown in Fig. 21a and which meets the standard of protection recommended where there is only one stairway. The communicating doors in the stairway enclosure shown in Figs. 24c and 21c are not, of course, essential. Should they be omitted, there would be no need for protecting the stairway at ground level, as described in 2.4.3(1).

2.4.5.6 The exit at ground level should, as far as possible, be in a position which is free from risk from adjoining doors or windows. Whilst a degree of risk can be tolerated where there are two stairways with separate exits, no such degree of risk should be accepted where there is only one stairway. One solution, if there is difficulty in the latter respect, is to provide two exits from the one entrance hall, either of which may be subject to some risk, but not both at the same time from the same fire (see Fig. 25).

2.4.5.7 A lift introduces a negligible fire hazard provided landing doors are fire resisting; the motor room is at the top and permanent ventilation is provided at the top of the shaft. There is, therefore, no objection to arranging lifts within a stairway enclosure on any floor, including the entrance floor.

2.4.5.8 Stores and ancillary accommodation are often planned at ground level and the same protection should be provided between stairways and the public space that serves such accommodation as is provided between stairways and the public space that serves the flats themselves.

2.4.5.9 Basement fires can lead to particularly hazardous conditions and, where any dwelling has access to only one stairway, the stairway should not continue to a basement, nor should a stairway to a basement

open out of any part of the building which has any connection to the main stairway. Even where every dwelling has access to two stairways, neither stairway should be continued directly to a basement but if one stops at ground level it need not be regarded as unsafe to continue the other one indirectly, i.e. by forming a ventilated lobby with two smoke-stop doors across the basement stairway in order to protect the ground floor escape route from the upper floors.

[3.4.3.2]

[3.4.4]

2.4.5.10 Reference should be made to Sections 5 and 6 in connection with 'Ancillary accommodation' and 'Engineering services' recommendations relevant to this clause (2.4.5).

2.5 VENTILATION IN STAGES II AND III

2.5.1 The dilution and dispersal of smoke entails the provision of natural or mechanical ventilation by:

(1) the provision of natural cross-ventilation in a main corridor obtained by means of manually operated ventilators, together with either permanent openings or ventilators automatically controlled by smoke detectors (see Fig. 26). Such cross-ventilation should not be interrupted by smoke-stop doors and the position of openings should be carefully considered to avoid short circuits or conditions of no differential pressure. The recommendations for the sizes and spacings of ventilation openings are those which are considered to be effective with a minimum wind speed of 5.5 kilometres per hour (approximately 3.4 miles per hour); but as it will not be possible to ensure this minimum condition at all times, an element of risk exists. It must be accepted that all risks cannot be entirely eliminated in means of escape, as, for example, in the failure or misuse of a self-closing door. However, careful planning of cross-ventilation can further reduce this risk by ensuring that openings are so placed that air currents along access corridors are induced from high to low areas of pressure (see Figs. 13*b*, 15*b* and 18*b*); or

(2) the provision of mechanical ventilation which may be acceptable in certain buildings. It is sometimes called 'pressurization' and entails mechanically maintaining a positive air pressure in Stage II and/or Stage III escape routes, so that smoke will be impeded from entering these routes from a fire within a dwelling. Full development of this method, however, lies in the future.

[6.4]

2.5.2 Where the principle of using natural cross-ventilation or mechanical ventilation is not adopted as a basis for the design of means of escape in Stage II, this is not to deny that facilities for the removal of smoke from corridors will prove beneficial. If a degree of permanent ventilation can be introduced into a building some gain in safety can result.

2.5.3 The provision of means of ventilation, as distinct from permanent or automatically controlled ventilation, may contribute to personal safety in a more general way. It will assist the fire service and will thereby reduce the risk that smoke will spread within the building. This Code therefore contains recommendations for a measure of ventilation to corridors but, as this provision is for the use of the fire service and is not directly related to safety during early escape, it is not necessarily provided in the form of permanent openings. Windows or doors that can be opened when desired will suffice (see Fig. 24*a*). The permanent openings to lobbies serve a different purpose since their function is to be effective at the time of escape. These openings, together with the doors that separate the lobbies from the corridor, may be used for venting the latter (see Figs. 15*a*, 18*a* and 23).

2.5.4 Although the general recommendation is that corridors should be capable of being ventilated independently of stairways, where any corridor (where smoke containment is used) is connected to two or more stairways these may safely be used for ventilation purposes (see Fig. 22). The stairways should, however, have permanent ventilation at every storey level to reduce the risk of their acting as flues, except that where each dwelling is provided with an independent alternative escape route to a main stairway the ventilation need not be permanent but may be by means of openable windows or ventilators. Where permanent openings are provided, the penetration of snow cannot be prevented, but fixed louvres will reduce the amount and will also reduce the degree of penetration by rain. Because penetration by snow cannot be wholly prevented, the

alternative method of venting, independently of stairways, is to be preferred. The fixing of louvres should not reduce the actual clear area required for permanent ventilation.

2.5.5 The above recommendations for ventilation may call for modifications in designs which are based only on earlier considerations. For example, if the stairways shown in Fig. 22 are not permanently ventilated as described above, the common corridor (serving flats without alternative means of escape) should be extended to the external walls as shown in Fig. 24a.

3. PLANNING: RECOMMENDATIONS

3.1 GENERAL

The principles expressed in general terms in Section 2 are set out below in the form of specific recommendations. This subject is one which calls for elasticity of approach and the specific recommendations which follow should be interpreted in the light of the previous discussion. (The numbers of corresponding clauses are shown in square brackets.)

NOTE. Figures are intended only to clarify points made in the text; it should not be assumed that these plans are more satisfactory than others which may be devised.

3.2 STAGE I: INTERNAL PLANNING OF FLATS AND MAISONNETTES

3.2.1 Flats. Every flat should have a protected private entrance hall and every living room and bedroom should have an exit which leads to hall or lobby. The recommendations given in *either* 3.2.1.1 or 3.2.2.2 should be applied.

3.2.1.1 Bedrooms should open directly out of the entrance hall and, wherever possible, their doors should be nearer to the entrance door of the flat than the door of a dining room, a living room or a kitchen (see Fig. 1). Where this arrangement is not practicable, the bedrooms may be further from the flat entrance door than other rooms provided that, in either case, no bedroom door is further from the main entrance door of the flat than 7.5 m (approximately 25 ft) (see Fig. 2). In both cases, all rooms other than bathrooms and w.c.'s (containing no fire risk) opening off the hall should be fitted with a Type 3 fire-resisting door (cupboard doors need not be self-closing) and the enclosing walls of the hall should have a fire resistance of not less than half-an-hour. [2.2.2.2]

3.2.1.2 Where the distance from a bedroom door to a flat entrance door exceeds 7.5 m (approximately 25 ft) (see Fig. 2) an alternative means of escape should be provided from that bedroom or by corridor, if more than one bedroom is involved, in addition to the requirements contained in 3.2.1.1 above. A linking balcony (see Fig. 17) (access to which should be by way of a doorway or suitably designed window with a very low sill) of minimum width 900 mm (approximately 3 ft) and a balustrade, minimum height 1200 mm (approximately 4 ft), to an adjoining flat is one acceptable solution. If it is necessary to pass from one bedroom to another in order to reach the alternative exit, the bedrooms should be connected by a pass door if the travel distance from any bedroom door to the door of another room in which the alternative means of escape is located exceeds 1.5 m (approximately 5 ft); or by an inner hall which is cut off by Type 3 fire-resisting doors located in partitions with a fire resistance of not less than half-an-hour from any other part of the flat (see Fig. 3). In any flat with an inner hall used in a planning arrangement similar to that illustrated in Fig. 3, any internal partition situated between the sleeping and living accommodation should also have a fire resistance of not less than half-an-hour. [2.2.2.3]

3.2.2 Flats entered from a floor above or from a floor below the flat

3.2.2.1 Where any flat is entered from the floor above or the floor below, no habitable room or kitchen should open off the entrance hall, nor should any meter cupboard, portable heating appliance, fixed heating appliance with a fire risk, casual storage or any other source of potential fire risk be situated in the entrance hall or on intermediate landings (see Figs. 4 and 5). [2.2.2.2]