

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

Part 5: Code of practice for firefighting stairs and lifts

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- British Fire Services' Association
- British Gas plc
- British Retailers Association
- British Telecommunications plc
- Building Employers Confederation
- Chartered Institution of Building Services Engineers
- Chief and Assistant Chief Fire Officers Association
- Consumer Policy Committee of BSI
- Department of Education and Science
- Department of Health
- Department of the Environment (Property Services Agency)
- Department of the Environment (Building Research Establishment) (Fire Research Station)
- Department of the Environment (Construction Directorate)
- Department of the Environment for Northern Ireland
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- National Council of Building Material Producers
- Royal Institute of British Architects
- Royal Institution of Chartered Surveyors
- Scottish Office (Building Directorate)
- Society of Chief Building Regulation Officers
- Timber Research and Development Association

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

This British Standard, having been prepared under the direction of the Fire Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 30 August 1991

- British Lift Association
- District Surveyors Association
- National Association of Lift Makers

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Foreword

This code of practice, prepared under the direction of the Fire Standards Policy Committee, is a revision of BS 5588-5:1986, which is withdrawn. 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 1: Code of practice for residential buildings;*
- *Part 4: Code of practice for smoke control using pressure differentials;*
- *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.*

This code provides recommendations for the design, construction and siting of firefighting stairs and lifts in order to assist the fire service in firefighting operations in high or large buildings or buildings with deep basements. It also includes recommendations for the maintenance of equipment installed in the firefighting shaft.

This code includes recommendations for the necessary combination of structural fire safety arrangements and smoke control for the firefighting shaft, as well as recommendations for the firefighting lift and its engineering and communication systems.

A firefighting lift, as well as being used as a normal passenger lift, is intended to transport firefighters and their equipment when there is a fire in the building. This code recommends design features necessary for a lift to be used with an acceptable measure of safety when there is a fire in a building. It is the product of a study of all aspects of the use of lifts during fires in buildings, including the history of failures of lifts and of casualties arising from their ill-considered use, and also of existing and earlier technical standards.

As far as possible this code makes references to BS 5655 for the construction of the lift, and adds only the provisions necessary for a firefighting lift that are not normally provided on an ordinary passenger lift. It should be seen as replacing Appendix G in BS 5655-1:1986 and BS 5655-2:1988.

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

NOTE Commentary text is printed in italics.

Some of the more important changes made in this revision are as follows.

- a) The criteria for the provision and number of firefighting shafts are now given in the Parts of BS 5588 dealing with particular building uses.
- b) Dual-entry firefighting lifts are now acceptable in certain circumstances.
- c) Firefighting lobbies need not be provided with permanent ventilation.
- d) The operation of the firefighting lift control system is described in greater detail.
- e) The firefighting shaft electrical services are described in greater detail.
- f) Recommendations for routine inspection and maintenance have been included.

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. A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations. In particular, attention is drawn to 3.3.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 36, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This code of practice provides guidance for designers in providing firefighting stairs and lifts to assist the fire service in firefighting operations.

Some recommendations are also made with respect to passenger, goods and service lifts adjacent to a firefighting lift where they affect the use and safety of the firefighting lift.

NOTE 1 The control system described in clause 14 is also suitable for evacuation lifts described in BS 5588-8 and should replace the fireman's switch control described in BS 2655 wherever possible.

NOTE 2 The titles of the publications referred to in this standard are listed on page 36.

2 Definitions

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

2.1 call

the operation of pressing a landing call button to call the lift, or, in the lift car, of pressing the appropriate button to take the lift to the desired level

NOTE See also 2.27.

2.2 car control station

the control panel in the lift car for the use of passengers

2.3 class 0

either:

- a) composed throughout of materials of limited combustibility; or
- b) a material classified as class 1 when tested in accordance with BS 476-7, and which has a fire propagation index I of not more than 12, and a subindex i_1 of not more than 6, when tested in accordance with BS 476-6.

2.4 control equipment

electrical switches, door interlocks and apparatus associated with the operation and programming of the lift service

2.5 depth (of a building)

distance between the lowest point of the floor of the lowest storey of a building, to the ground level measured at the centre of that face of the building where the distance is greatest (see Figure 0)

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

2.6 dual-entry firefighting lift

a firefighting lift provided with two sets of doors, one used for normal operations and the other in the firefighting mode

2.7 emergency lighting

lighting provided for use when the supply to the normal lighting falls

2.8 evacuation level(s)

the storey or storeys at which final exits suitable for the evacuation of persons are available

NOTE This is not necessarily fire service access level (see 2.16).

2.9 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

2.10 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

NOTE The firefighting lift is a development of the type of lift known as a fireman's lift. Although existing firemen's lift installations may be replaced, firemen's lifts should not be used in new installations. Only lifts complying with this code of practice can be designated firefighting lifts.

2.11 firefighting lobby

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

2.12 firefighting shaft

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

2.13 firefighting stair

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

2.14 fire main

a water supply pipe, fitted with landing valves at specified points, installed in a building for firefighting purposes

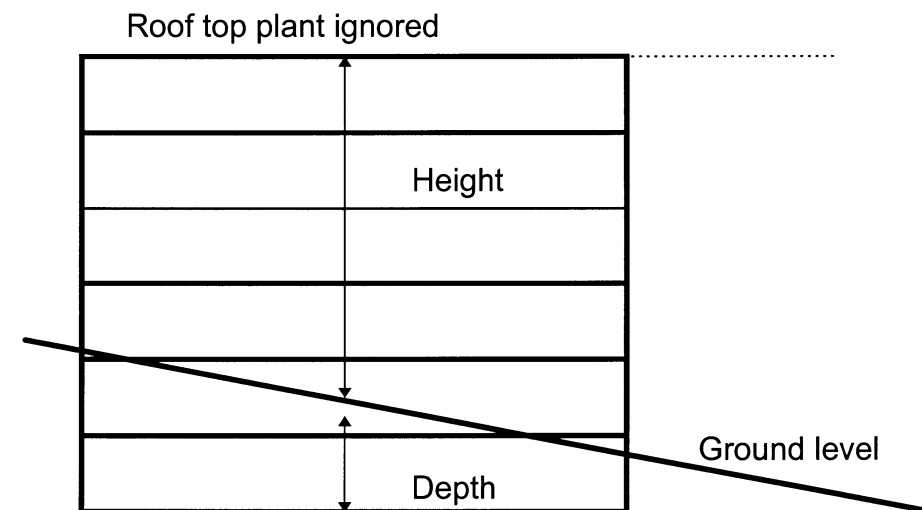


Figure 0 — Height and depth of a building

2.15 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

2.16 fire service access level

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

2.17 floor area

the area enclosed by the inner surfaces of walls, including internal walls

2.18 height (of a building)

the level of the surface of the highest point of the floor of the highest storey (excluding any such storey consisting exclusively of plant rooms), measured from the level of the surface of the lowest fire service access roadway adjacent to the entrance to the firefighting shaft where the measurement is greatest (see Figure 0)

2.19 lift landing

the lobby floor space from which the lift car is normally entered at each level

2.20 lift landing door

hinged or sliding portion of a lift well enclosure at each landing that gives access to a lift car when open

NOTE This is not the lift car door.

2.21 lift machine

the unit, including the motor, that drives and stops the lift

2.22 lift well

space in which the lift and the counterweight (if any) move. This space is materially enclosed by the bottom of the pit, the vertical walls and the ceiling

2.23 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.

2.24**non-combustible material**

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

2.25**pressure differential system (pressurization)**

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

2.26**protected**

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

2.27**registered call**

a call made on a car control station or from a landing call button that is accepted by the control equipment

2.28**smoke shaft**

an enclosed space in a building provided for venting smoke from a firefighting stair or one or more firefighting lobbies

2.29**vent**

a window, rooflight, door, louvre, grille or other device either open or capable of being opened to permit the passage of air between a part of the building and the external air

3 Use of this code**3.1 Background**

When the fire service is called to a fire a speedy response is expected of it. Considerable public resources in modern communications and mobilizing systems, fast efficient mobile appliances, personnel and training are committed to this objective, which is fundamental to effective firefighting and rescue operations. However, the time taken to reach the entrance of a building may be but a fraction of the time it takes to travel through the building to reach the fire and commence firefighting operations.

Fire service personnel faced with a task of firefighting on a floor high above the ground need to be able to reach the fire quickly, with their equipment, and having done so they need also to have sufficient energy left for the arduous and prolonged task of firefighting. Physical safety and lives, their own and those of the occupants of the building, and the preservation of the building and its contents, may well be hazarded by delays in reaching the fire floor. Having done all that it can to limit response time, the fire service is therefore dependent on the foresight of designers in providing it with the necessary facilities to operate effectively within the building when it arrives there. This means that in high-rise buildings at least one of the lifts needs to be readily available and of suitable design for firefighters to use, i.e. a firefighting lift. The firefighting lift may be separate from or part of a group of lifts.

The benefits to the fire service from the provision of firefighting shafts are not confined to high-rise buildings. Fires in deep basements create particularly difficult access problems in which firefighting stairs and lifts can be invaluable. Also, in buildings containing concentrations of combustible materials in large areas above or below ground level, firefighting stairs (but not necessarily lifts) will afford ready and safe access.

In a fire the hazards for passengers who may become trapped if a lift fails are so great that lifts (other than lifts complying with BS 5588-8 provided for the evacuation of disabled persons) should not be used as means of escape and the stairs should be used instead: there have been many reported cases of lift failures and casualties arising from the ill-considered use of lifts during fires in buildings. The principle of protecting lift wells, although not necessarily for personal safety, is long-established practice, but the lift machinery is equally important and lift machine rooms have often not received the attention which is necessary to ensure maximum protection and reliability of the installation.

Unlike a normal passenger lift, a firefighting lift needs to be able to transport fire service personnel and their equipment with a high degree of safety when there is a fire in the building. It is essential that means to free passengers who may become trapped in a stalled car are provided, even though a duplicated power supply is provided.

It is normal fire service practice to take a firefighting lift to a floor below that of the fire (floor above if a basement fire) to avoid both fire service personnel and the lift car being directly exposed to the risk of injury or damage before the fire situation can be assessed and firefighting started. Although a firefighting lift will enable firefighters to approach a fire without delay it cannot fully satisfy the needs for fire service access within the building. A firefighting lobby approach stair is also necessary for four important purposes:

- a) as means of final approach to the fire floor;
- b) for floor-to-floor movement during firefighting operations;
- c) to serve as an essential assured and safe route of egress for the fire service if the lift should fail or its reliability become uncertain; and
- d) for the firefighting lobby on the floor below the fire floor to serve as a safe area where firefighters and firefighting equipment may be assembled before commitment to firefighting operations.

The advantage of fire service personnel using a lift to reach the upper floors of a building will be lost if it is then necessary to lay hose from the street to deal with the fire. This means that wherever a lift is to be used for firefighting access, a fire main and landing valves will also be needed.

When planning firefighting stairs and the structural accommodation for lift installations it is not enough to anticipate fires only within the occupied floor areas and to consider the firefighting shaft as being free from risk. Experience has shown that fires in such areas result in damage and disruption out of all proportion to their size. These fires also require the speedy intervention of the fire service, and the structural design needs to take account of the need to minimize the effect of such fires on the lifts and stairs that firefighters will rely on to reach them.

Reliability of power supplies and circuitry is yet another important consideration. These are also vulnerable to fire and need to be protected. The effects of water ought also to be considered as there have been incidents where lift control malfunction and failure have occurred because water has entered a lift well and reached electrical door interlocks, car controls, etc. Such water can come from many sources including open landing valves, firefighting jets, burst hose or sprinkler discharges.

3.2 Relationship with means of escape

A firefighting stairway will normally be used for means of escape and therefore will need to meet the recommendations for protected stairways given in the appropriate Part of BS 5588.

No recommendations are made in this code for the use of any lift for the purpose of escape in the event of fire. However, BS 5588-8 includes the recommendation that, subject to the provision of satisfactory fire procedures and management control, a firefighting lift may be used for the evacuation of disabled people in case of fire.

3.3 Relationship with statutory provisions

It is important to appreciate the relationships between this code and the various statutory provisions relevant to the design and construction of new buildings and to the fire precautions to be provided in existing buildings. The relevant legislation indicated in general terms in 3.4 has to be complied with in the event of a conflict with this code.

3.4 Building regulations

The design and construction of new buildings, and of alterations of existing buildings, are controlled by the following statutory provisions which are 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, which may include the provision of firefighting stairs and/or lifts.

3.5 Application of all the recommendations

Individual recommendations of this code should not be applied in isolation because of their interdependence and joint contribution to the provision of a relatively safe environment for firefighting.

NOTE Where it would be impracticable to meet all the recommendations when installing a firefighting shaft in an existing building, it is suggested that the advice of the relevant authorities be sought.

3.6 Provision and number of firefighting shafts

The criteria for the provision and number of firefighting shafts in many building types are given either in building regulations or in the relevant Part of BS 5588. However, where no such guidance is available the provision and number of firefighting shafts should be based on the following.

- a) Buildings or parts of buildings where:
 - 1) the height (see 2.18) of the surface of the floor of the topmost storey (excluding any storey consisting exclusively of plant rooms) exceeds 15 m; or

2) the depth (see **2.5**) of the surface of the floor of the lowermost storey exceeds 10 m;

should be provided with firefighting shafts each containing:

- i) a firefighting stair;
- ii) firefighting lobbies provided with a fire main;
- iii) a firefighting lift installation.

NOTE 1 The reference to parts of buildings covers situations such as a tower block rising above a podium.

b) Buildings where:

1) the height (see **2.18**) of the surface of the floor of the topmost storey exceeds 7.5 m, with the floor area of any storey above the ground storey not less than 600 m²; or

2) there are two or more basement levels each with a floor area exceeding 900 m²; should be provided with firefighting shafts each containing:

- i) a firefighting stair;
- ii) firefighting lobbies.

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

- 1) with a height (see **2.18**) exceeding 18 m; or
- 2) with a depth (see **2.5**) exceeding 10 m; or
- 3) above the ground storey in buildings as described in item b) 1); or
- 4) below the ground storey in buildings as described in item b) 2);

the floor area on that storey served by any firefighting shaft does not exceed 900 m² and the distance along which hose can be laid from the doorway between the firefighting shaft and the accommodation to any point on that storey does not exceed 60 m.

NOTE 2 If the internal layout is not known at the design stage, a direct line measurement of 40 m may be used for design purposes, provided that the layout of the building when occupied satisfies the 60 m criterion.

3.7 Diagrams

The figures in this code are intended to clarify concepts, and should not be taken as indicating the only acceptable forms of planning.

NOTE Details not relevant to the concept illustrated, for example fire mains and landing valves, are not included.

3.8 Relationship with sprinkler installations

Sprinkler systems, provide an effective means of controlling the outbreak of fire. However, the design criteria in BS 5306-2 are intended to control rather than suppress fire. Fire brigade access to the parts of a building affected by fire will still be required even if a sprinkler system is installed. The recommendations of this code of practice should apply irrespective of the level of sprinkler protection.

Section 2. Planning and construction

4 Firefighting shafts

4.1 General

A firefighting shaft provides a protected access route for firefighters up or down a building. In most cases it also serves as a means of escape for the occupants and for normal circulation. The recommendations in this section are for measures in addition to those which may be necessary to fulfil the means of escape function.

A firefighting shaft always contains a firefighting stair and, on every storey served by the stair, a firefighting lobby between the stair and the accommodation. A firefighting lift opening into the firefighting lobby may need to be provided in certain buildings.

The function of the firefighting lift is to transport firefighting personnel and equipment to save time and effort. The firefighting stair is for communication over short distances and as a line of retreat should the firefighting lift fail, and the firefighting lobby gives protection to the firefighting lift and stair as well as being a bridgehead from which the fire may be attacked.

4.2 Extent of firefighting stairs and lifts

NOTE The terms “tall building”, “deep basement” and “large floor area” are not defined, as the criteria for the provision and number of firefighting shafts in many building types are given either in building regulations or in the relevant Part of BS 5588. Where no such guidance is available the provision and number of firefighting shafts is to be based on the criteria given in 3.6.

4.2.1 Commentary

Firefighting shafts need to be provided in tall buildings, buildings with deep basements, and buildings with large floor areas. The firefighting shaft ought to be located so that it allows access to every part of every storey that it serves. Where storeys are large more than one firefighting shaft may be necessary to provide access within a reasonable distance of a firefighting shaft.

Whilst it is preferable for the firefighting shaft to serve all storeys of a building, this is not always necessary. The following considerations affect the extent of firefighting shafts and of the firefighting lifts and stairs in them. The minimum extent of firefighting lifts and stairs is shown in Figure 1.

In tall buildings and buildings with deep basements the firefighting shaft ought to contain a firefighting lift. Fire service personnel may need to check several storeys when they arrive to assess the situation, and the firefighting lift ought to serve all the storeys they might need to reach.

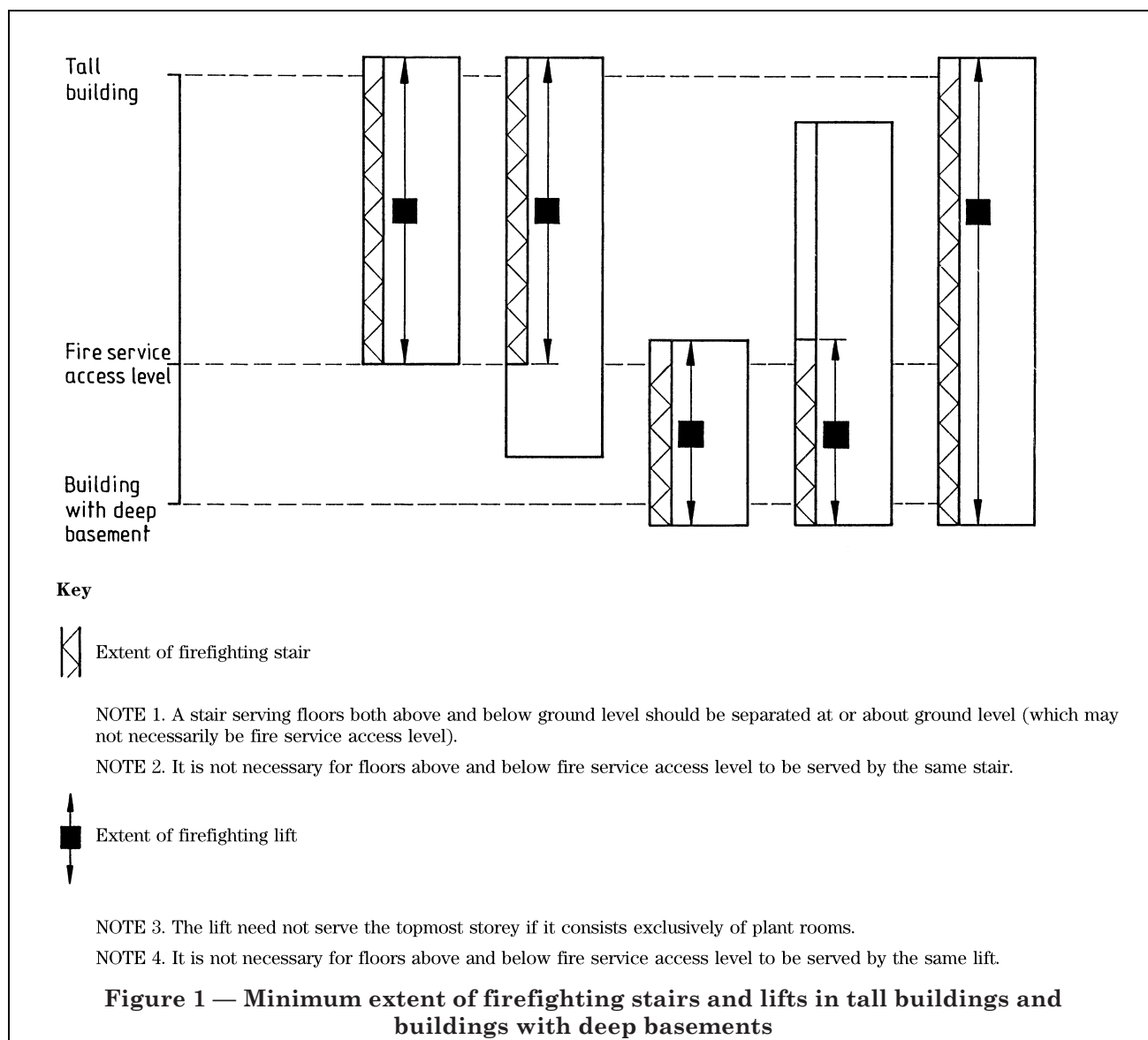
Because the firefighting stair is the line of retreat if the firefighting lift fails, the firefighting stair needs to serve every storey served by the firefighting lift. The lift and stair are also used together during firefighting operations.

In large complexes, with a variety of uses, different firefighting shafts may serve different parts of the complex: for example, in a complex consisting of high-rise offices over a shopping centre, the offices could have a firefighting shaft that did not serve the shopping centre. It is important that any such arrangement is logical and simple, so that fire service personnel have no difficulty in finding the firefighting shafts serving the areas they need to reach.

It is considered undesirable to recommend the installation of a firefighting lift (within a means of escape staircase) as it has the potential for increasing the fire load. However, in the case of refurbished buildings where design constraints make the provision of a firefighting lift in the firefighting lobby impracticable then subject to additional measures [see 4.2.2 g)] the lift may be sited within its own fire-resisting shaft in the firefighting stair enclosure. It has also been considered undesirable to recommend this provision in residential buildings as the lack of ongoing statutory control makes the recommended measures unenforceable.

Buildings or complexes which are not high and do not have deep basements, but have a large floor area, will still benefit from the provision of firefighting shafts. A firefighting lift is not necessary in such buildings because the vertical transport of personnel and equipment is not a problem, but the firefighting shaft ought to contain a firefighting stair and firefighting lobbies.

To prevent smoke from a basement fire smoke-logging the firefighting stair at all levels, firefighting stairs serving storeys both above and below ground level ought to be separated at ground level.



4.2.2 Recommendations

The following recommendations are applicable.

- a) Firefighting shafts should be provided in tall buildings, buildings with deep basements, and buildings with large floor areas.
- b) Firefighting shafts should be provided with firefighting lifts in the following cases:
 - 1) in buildings with deep basements, in which case the firefighting shaft should serve fire service access level and all storeys below it;
 - 2) in tall buildings, in which case the firefighting shaft should serve fire service access level and all storeys above it, although the firefighting lift need not serve any storey on which there is no entrance to any accommodation [see item d)] or the topmost storey of the building if it consists exclusively of plant rooms;

3) in a building which is both deep and tall, in which case the firefighting shaft should serve all storeys, although the firefighting lift need not serve any storey on which there is no entrance to any accommodation [see item d)] or the topmost storey of the building if it consists exclusively of plant rooms. Storeys below fire service access level may be served by a different firefighting lift from that serving the upper storeys, and any firefighting stair that serves levels both above and below ground level should be separated at ground level.

NOTE A fire-resisting partition containing a FD 30S fire door (see 9.4.1) may be used to divide the stair.

- c) Firefighting shafts in large floor area buildings that are neither tall buildings nor buildings with deep basements need contain only firefighting stairs and firefighting lobbies.

d) If a building contains separate units of accommodation with their own entrances from common circulation spaces, for example as is the case with some flats and maisonettes, there should be access to each unit from a firefighting lift, either directly or via a common circulation space.

e) If a firefighting shaft contains a firefighting lift, the firefighting stair in that shaft should serve every storey served by the firefighting lift.

f) The stair from a firefighting shaft may be extended into a part of the building not requiring a firefighting shaft provided that either:

- 1) the firefighting shaft is extended accordingly, including the provision of firefighting lobbies and any fire main; or
- 2) the extension to the stair is separated from the firefighting shaft by fire-resisting construction [see 9.3.2 b)].

g) It is considered acceptable to install the firefighting lift in the firefighting stair enclosure (see Figure 1a) in the following circumstances:

- 1) the building is put to non residential use; and
- 2) the firefighting lift is sited so that the movement of fire brigade personnel between the lift and the lobby does not impede the use of the stair by the building occupants during an evacuation; and
- 3) the building evacuation scheme is single stage; and
- 4) if the lift is to be used for the evacuation of disabled people the provisions of BS 5588-8 are complied with; and
- 5) the firefighting lift is not to be used as a goods or service lift; and
- 6) the lift well should be inspected monthly and any combustible materials removed.

4.3 Siting of firefighting shafts

4.3.1 Commentary

Firefighting shafts ought to be sited against an exterior wall to facilitate smoke control. In buildings with a high fire risk or high fire load, firefighting shafts need to be sited against an exterior wall, even if a pressurization system is provided, to facilitate firefighting and for the safety of fire service personnel.

The separation of the accommodation from the firefighting shaft (see 4.4), together with the provision of means for smoke control, is intended to provide a substantially smoke-free environment for firefighting operations.

If it is not possible to locate the firefighting shaft against an exterior wall then the route from the fire service entrance to the firefighting shaft needs to be as short as possible and protected by fire-resisting construction to ensure that fire does not affect the route or cut off the means of escape for fire service personnel fighting a fire within the building. The layout of the firefighting shaft at fire service access level ought to be such that firefighters entering the firefighting lift and persons escaping down that firefighting stair do not obstruct each other. Longer corridors may be acceptable to a fire authority if enhanced fire protection or facilities are provided, e.g. the protected corridor serving only the firefighting shaft; the provision of a second protected corridor; the provision of a wet fire main.

The firefighting lobby at fire service access level needs to be large enough to act as a command post where firefighters and firefighting equipment may be safely assembled. A building might have a building control centre that could be used by the fire service, or the fire service might use a mobile command centre, etc., and such operational details ought to be discussed by the developer with the fire service. Vehicular access, including access to any inlet to a dry fire main, may be required under building regulations or local legislation, or may be covered in the relevant part of BS 5588.

4.3.2 Recommendations

The following recommendations are applicable.

- a) At fire service access level, entry to a firefighting shaft should be available either:
 - 1) directly from the open air [see Figure 2 (a) (1) and Figure 2 (b)]; or
 - 2) by way of a protected corridor not exceeding 18 m in length. The corridor should be considered to be part of the firefighting shaft, and any access to it from the accommodation should be by way of protected lobbies. It should not be necessary for persons escaping down the stair to pass through the firefighting lobby at fire service access level. Where the corridor forms part of the means of escape from the accommodation it should be 500 mm wider than that required for means of escape purposes (to allow room for fire service personnel to move towards the firefighting shaft), and the firefighting lobby should have a minimum area of 5 m² clear of any escape routes so that it can act as a fire service mustering point [see Figure 2 (a) (2)].
- b) Where a dry fire main is provided, there should be appliance access to within 18 m of the inlet connection to the main, within sight of the connection and with direct access thereto.