



Bespoke Fire Safety Training
NOS-3

Evaluate Design Submissions
Against Approved Document B

***Access and facilities for the fire
service***

(slides)

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Fire Protection Association

Course code:
NOS-3

Course title:
**Evaluate Design Submissions
Against Approved Document B**

Subject:
Access and Facilities for the Fire Service

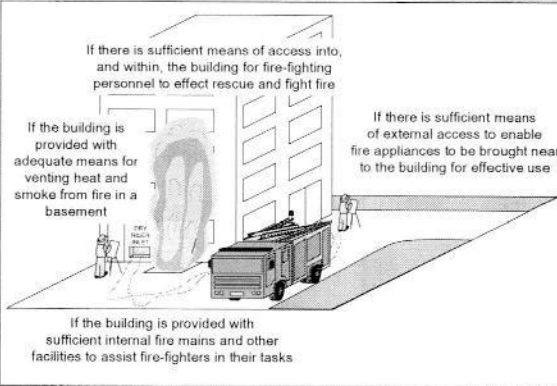
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INTRODUCTION

<i>Requirement</i>	<i>Limits on application</i>
Access and facilities for the fire service	
B5-(1) The building shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life.	
(2) Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building.	

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Performance



The diagram shows a multi-story building with a fire engine parked outside. Arrows indicate access points for fire-fighting personnel and appliances. Text boxes describe different performance requirements for building access and facilities.

If there is sufficient means of access into, and within, the building for fire-fighting personnel to effect rescue and fight fire

If the building is provided with adequate means for venting heat and smoke from fire in a basement

If there is sufficient means of external access to enable fire appliances to be brought near to the building for effective use

If the building is provided with sufficient internal fire mains and other facilities to assist fire-fighters in their tasks

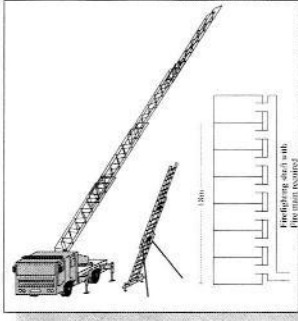
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Facilities appropriate to a specific building

In tall buildings, and those with large basements, firefighters will invariably work inside

These buildings need special access facilities (firefighting shafts), and they need to be equipped with fire mains

In blocks of flats, the design of the firefighting shaft may be slightly different from other buildings. This is because in flats, every floor will be a compartment floor.



The diagram illustrates a fire truck with a ladder extended to a building. A vertical line represents the firefighting shaft, and a horizontal line represents the fire main running through it. A label '18m' indicates the height of the shaft.

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SECTION 16 – FIRE MAINS

Introduction

Section 16 starts off by simply describing the various types of fire main.

- Rising mains, which serve storeys above fire brigade access level, and
- Falling mains, which serve storeys below fire brigade access level.

Both rising and falling mains, can be of two types:

- Dry type, which are normally empty of water, and charged by the fire service when needed, and
- Wet type, which are normally kept charged, and are supplied by tanks and pumps within the building.

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SECTION 16 – FIRE MAINS

Provision of fire mains

- Some type of fire main must be provided within every firefighting shaft
- Broadly speaking, a firefighting shaft must be provided in every building which has a floor more than 18m above fire brigade access level, or a basement more than 10m below fire brigade access level
- By far the most common type of fire main is the dry rising main, or "dry riser"
- In buildings with floors more than 60m above fire brigade access level though, firefighting pumps are at the limit their capability, so wet mains *must* be provided



SECTION 16 – FIRE MAINS

Design and construction of fire mains

Other than to stress that a fire main is an integral part of a firefighting shaft, ADB does go into detail about the design and construction of fire mains

The reader is referred to sections 2 and 3 of BS 5306: Part 1: 1976 *Fire extinguishing installations and equipment on premises, Hydrant systems, hose reels and foam inlets.*



SECTION 17 - VEHICLE ACCESS

Introduction

Vehicle access to the exterior of a building is needed to enable high rise appliances, to be used, and to enable pumping appliances to supply water and equipment for firefighting and rescue

Access requirements increase with building size and height



SECTION 17 - VEHICLE ACCESS

Buildings not fitted with fire mains

Table 20 Fire service vehicle access to buildings (excluding blocks of flats) not fitted with fire mains

Total floor area (a) of building m ²	Height of floor of top storey above ground (a)	Provide vehicle access (b) to:	Type of appliance
up to 2000	up to 11 over 11	see paragraph 17.2 15% of perimeter (c)	pump high reach
2000-8000	up to 11 over 11	15% of perimeter (c) 50% of perimeter (c)	pump high reach
8000-16,000	up to 11 over 11	50% of perimeter (c) 50% of perimeter (c)	pump high reach
16000-24,000	up to 11 over 11	75% of perimeter (c) 75% of perimeter (c)	pump high reach
over 24,000	up to 11 over 11	100% of perimeter (c) 100% of perimeter (c)	pump high reach

See notes on Table 20

Page 102

NOTE 1
ADD all Floor
TOTALS



SECTION 17 - VEHICLE ACCESS

Buildings not fitted with fire mains

Paragraph 17.1:

Requirements cannot be made under the Building Regulations for work to be done outside the site of the works shown on the deposited plans (upgrading and widening roads for example)

It may not always be possible to upgrade an existing route across a site to a small building such as a single dwelling-house.

In such situations, the Building Control Authority is advised to consult with the Fire Authority to determine a suitable course of action.



SECTION 17 - VEHICLE ACCESS

Buildings fitted with fire mains

- The vehicle access facilities for a building provided with a fire main, are minimal.
- A pumping appliance must get to within 18m of each fire main inlet connection point, and that the inlet should be visible from the appliance.

In the case of a building fitted with wet mains, the pumping appliance access should be to within 18m, and within sight of, a suitable entrance giving access to the main, **and** in sight of the inlet for the emergency replenishment of the suction tank for the main



SECTION 17 - VEHICLE ACCESS

Design of access routes and hard standings

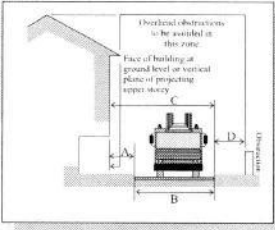
Appliance type	Minimum width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	12.5
High rise	3.7	3.1	26.0	29.0	4.0	17.0
Local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



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SECTION 17 - VEHICLE ACCESS

Design of access routes and hard standings

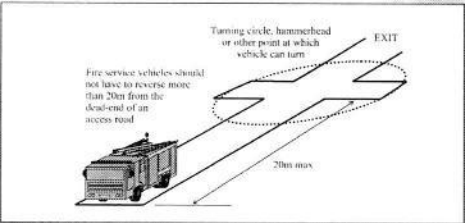


	TL	HP
A. Maximum distance of near edge of hardstanding from building	4.9	2.0
B. Minimum width of hardstanding	5.0	5.5
C. Minimum distance of further edge of hardstanding from building	10.0	7.5
D. Minimum width of unobstructed space	NA	2.2

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SECTION 17 - VEHICLE ACCESS

Design of access routes and hard standings



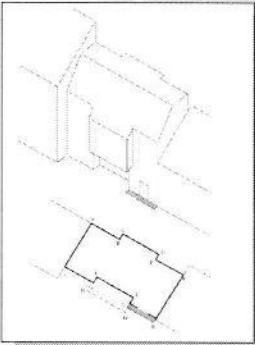
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SECTION 17 - VEHICLE ACCESS

Building footprint and perimeter

Effectively, the footprint of the building can be imagined as being the piece of ground that would stay dry if it rained on a perfectly windless day.

The perimeter is the length of the outside edge of the footprint, *minus the length of any walls which are common to other buildings.*



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SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Introduction

In tall buildings, and buildings with deep basements, reaching the fire, and working inside the building near the fire, necessitates the provision of special facilities

These facilities may include

- firefighting lifts
- firefighting stairs
- firefighting lobbies

These are combined into a protected shaft known as the firefighting shaft

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SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Provision of firefighting shafts

There are 3 designs of firefighting shaft described in Section 18:

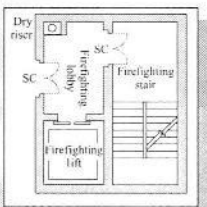
- Stair, lobby, and lift
- Stairs and lobby only
- Stairs and lift only

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SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Provision of firefighting shafts

Stair, lobby, and lift



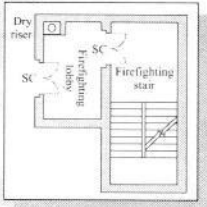
"Buildings with a floor at more than 18m above fire service vehicle access level, or with a basement at more than 10m below fire service vehicle access level, should be provided with firefighting shafts containing firefighting lifts".

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SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Provision of firefighting shafts

Stairs and lobby only



"Buildings in Purpose Groups 4, 6 and 7(a) with a storey of 900m² or more in area, where the floor is at a height of more than 7.5m above fire service vehicle access level, should be provided with firefighting shaft(s), which need not include firefighting lifts".

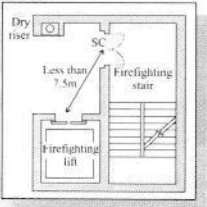
"Buildings with two or more basement storeys, each exceeding 900m² in area, should be provided with firefighting shaft(s), which need not include firefighting lifts".

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SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Provision of firefighting shafts

Stairs and lift only



"Because of the high degree of compartmentation in blocks of flats/ maisonettes, the firefighting lobby is not necessary.

Similarly, the firefighting lift can open directly into such protected corridor or lobby, but the firefighting lift landing doors should not be more than 7.5m from the door to the firefighting stair".

LOBBY NOT
NEED FOR
FLATS.

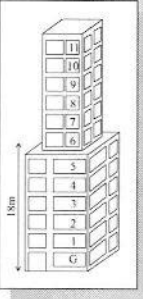
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SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Number of firefighting shafts

Buildings with sprinklers

Largest qualifying floor area (m ²)	Minimum number of firefighting shafts
less than 900	1
900-2000	2
over 2000	2 plus 1 for every additional 1500m ² or part thereof



SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Number of firefighting shafts

Buildings without sprinklers

- If a building is not fitted with sprinklers, at least one firefighting shaft should be provided for every 900m² (or part thereof) of floor area of the largest floor qualifying floor.

The term "qualifying floor" is not used in paragraph 18.7 b or c, but the text seems to boil down to the same thing.

SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Location of firefighting shafts

- Firefighting shafts must be sited such that every part of *every* storey (other than at fire service access level) is no more than 60m from a fire main outlet, measured on a route suitable for laying hose
- If the internal layout is unknown at the design stage, then this distance is reduced to 40m ($\frac{2}{3}$ of 60m).

SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Design and construction of firefighting shafts

ADB currently states that detailed information about planning and construction, firefighting lift installation, and electrical services, can be found in BS 5588: Part 5: 1991 *Code of practice for firefighting stairs and lifts*.

However, this standard has been superseded since the publication of ADR

**The current edition of BS 5588 Part 5, is:
2004, Access and facilities for fire-fighting**

Additionally, this new standard states that all recommendations relating to fire-fighting lifts are now covered in BS EN 81-72:

BS EN 81-72:2003: Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts. Firefighters lifts



SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Rolling shutters in compartment walls

*“Rolling shutters should be
capable of being opened and
closed manually by the fire
service”.*



SECTION 19 – VENTING OF HEAT AND SMOKE FROM BASEMENTS

Provision of smoke outlets

Smoke vents from basements are **not required** in the following cases:

- a) a basement in a single family dwellinghouse.
- b) any basement storey that has:
 - i) a floor area of not more than 200m², and
 - ii) a floor not more than 3m below the adjacent ground level.
- c) a strong room
- d) where basements have external doors or windows, the compartments containing the rooms with these doors or windows do not need smoke outlets.



SECTION 19 – VENTING OF HEAT AND SMOKE FROM BASEMENTS

Provision of smoke outlets

- Where practicable each *basement space* should have one or more smoke outlets
- Otherwise, there must be facility to vent the whole basement sequentially
- Each basement storey should have its own smoke outlet connected directly to open air.
- If a basement is compartmented, each compartment should have direct access to venting, (without having to vent through another compartment)

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SECTION 19 – VENTING OF HEAT AND SMOKE FROM BASEMENTS

Natural smoke outlets

- Smoke outlets should be sited at high level and be evenly distributed
- Their combined cross-sectional should not be less than 1/40th of the floor area of the storey they serve
- Separate outlets should be provided from places of special fire hazard
- If the outlet terminates at a point that is not readily accessible, it should be unobstructed and only be covered with a non-combustible grille or louvre
- Otherwise, the outlet may be covered with a "panel, stallboard or pavement light which can be broken out or opened" (the position of the covered outlets should be suitably indicated)
- Outlets should not be placed where smoke issuing from them would prevent the use of escape routes from the building.

PLANET
RULED -
KITCHENS
in schools only

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SECTION 19 – VENTING OF HEAT AND SMOKE FROM BASEMENTS

Construction of outlet ducts or shafts

The diagram illustrates the construction of an outlet duct or shaft. It shows a cross-section of a building with a basement and a ground floor. A duct is shown rising from the basement, passing through the ground floor, and exiting through the external wall. The duct is labeled 'F.R. construction' (Fire Resistant construction). The basement outlet is labeled 'Basement outlet with break out or openable cover'. The ground floor outlet is labeled 'Stallboard outlet with grill or removable cover'.

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SECTION 19 – VENTING OF HEAT AND SMOKE FROM BASEMENTS

Mechanical smoke extract

- A system of mechanical extraction may be provided as an alternative to natural venting provided that the basement storey(s) are fitted with a sprinkler system
- it is not considered necessary...to install sprinklers on the storeys other than the basement(s)



Bespoke Fire Safety Training

NOS-3

Evaluate Design Submissions
Against Approved Document B

***Access and facilities for the fire
service***

(handout)

INTRODUCTION

The Requirement

Sections 16 to 18 of ADB deal with requirement B5 of Schedule 1 to the Building Regulations 1991:

Requirement

Limits on application

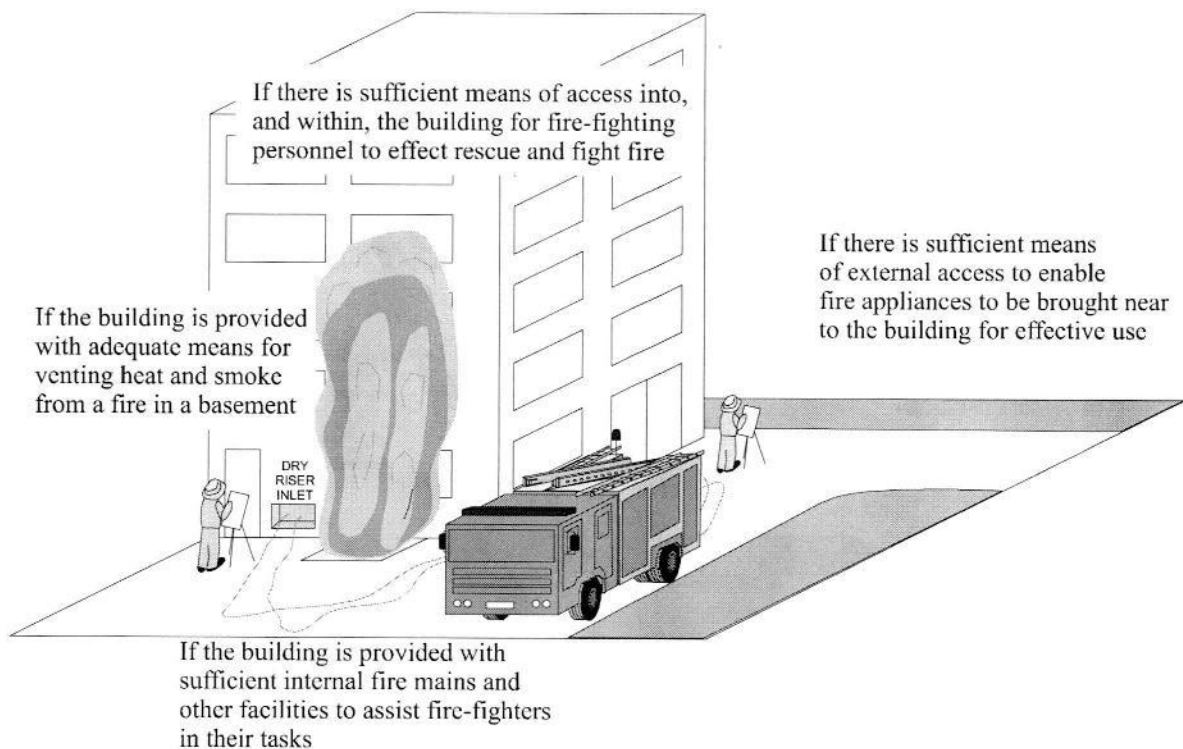
Access and facilities for the fire service

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

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

PERFORMANCE

In the Secretary of State's view the requirement of B5 will be met:



Although it seems, from the list above, that the Secretary of State wants firefighters to fight fires, B5 goes on to say that

"these access arrangements and facilities are only required in the interests of the health and safety of people in and around the building. The extent to which they are required will depend on the use and size of the building in so far as it affects the health and safety of those people".

This raises two issues. Firstly, it is clear that B5 has nothing to do with helping firefighters to prevent buildings burning down, its only purpose is to help save lives, and prevent injury. The second issue, though, is the extent to which it would be possible to extend the term “*health and safety of people....around the building*”.

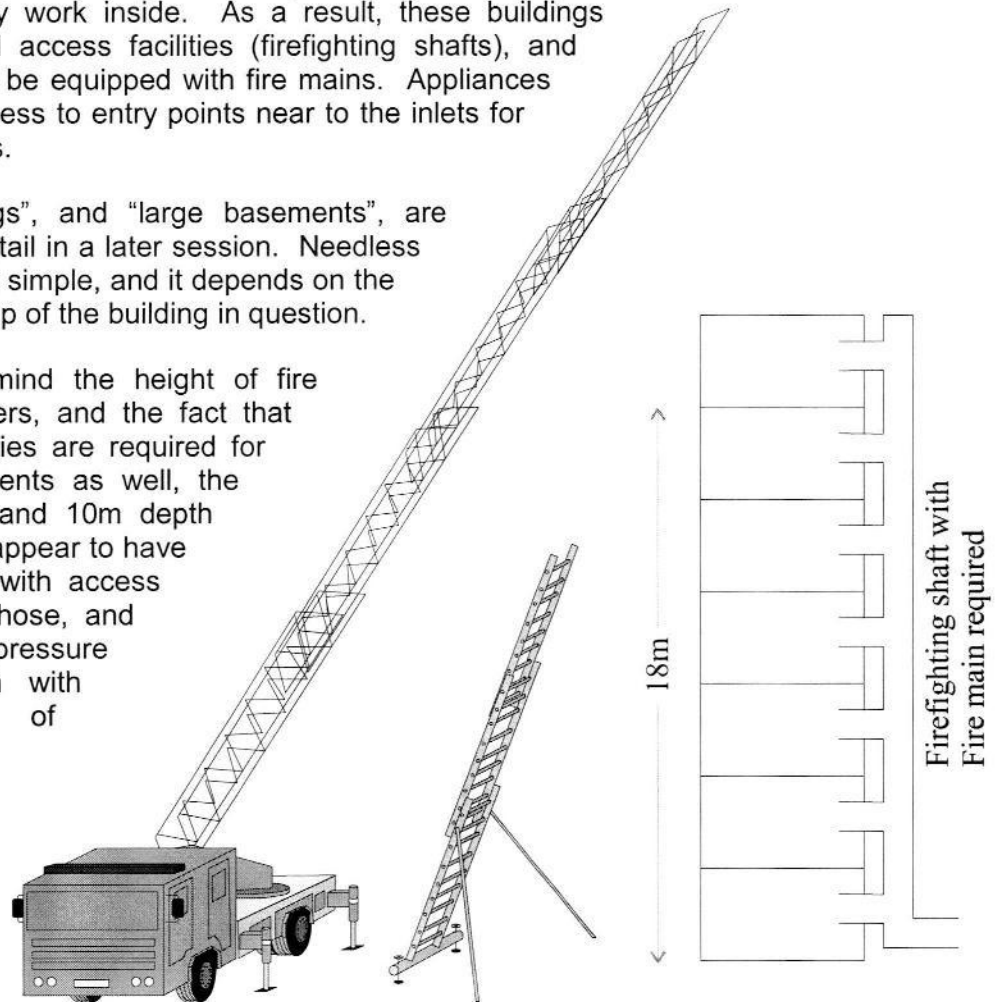
Facilities appropriate to a specific building

B5.ii makes it clear that the type of facilities which are provided for firefighters, depends to a great extent on the size of the building. It states that “*generally speaking fire fighting is carried out within the building*”, but of course it actually means “*generally speaking rescue is carried out within the building*”.

- a. In tall buildings, and those with large basements, firefighters will invariably work inside. As a result, these buildings need special access facilities (firefighting shafts), and they need to be equipped with fire mains. Appliances will need access to entry points near to the inlets for the fire mains.

“Tall buildings”, and “large basements”, are defined in detail in a later session. Needless to say, it isn’t simple, and it depends on the purpose group of the building in question.

Bearing in mind the height of fire service ladders, and the fact that special facilities are required for deep basements as well, the 18m height and 10m depth limits would appear to have more to do with access for lines of hose, and water pressure issues, than with the length of ladders.



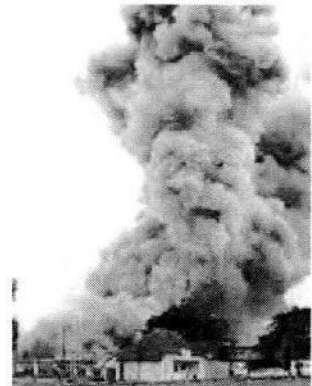
- (d). In blocks of flats, the design of the firefighting shaft may be slightly different from other buildings. This is because in flats, every floor will be a compartment floor. This change in the design of the shaft is discussed in a later session.
- b. In buildings not described in a, the facilities offered by the normal means of escape, and the ability to work from ladders and appliances on the perimeter, will generally be adequate without special internal arrangements. Although the facility of vehicle access may be needed to some or all of the perimeter, depending on the size of the building.

- c. For dwellings and other small buildings, the only facility necessary is usually only to ensure that the building is sufficiently close to a point accessible to fire brigade vehicles.
- e. If products of combustion from basement fires escape via stairways, access becomes difficult for fire service personnel due to high temperatures, and poor visibility. The problem is reduced by providing the facility of smoke vents from basements.

Insulating core panels

Over recent years there have been a number of increasingly hazardous fires in buildings in which large insulated sandwich panels (LISP's) have been present. The fire at Sun Valley Poultry in Hereford in September 1993, in which two firefighters died, focused attention on the use of these panels and their particular behavior when involved in fire.

In the current edition of ADB, Appendix F is dedicated to explaining the potential problems resulting from the use of LISP's, and the possible solutions, although they are referred to as "*insulating core panels*" in the document.



SECTION 16 – FIRE MAINS

Introduction

Section 16 starts off by simply describing the various types of fire main.

- Rising mains, which serve storeys above fire brigade access level, and
- Falling mains, which serve storeys below fire brigade access level.

Both rising and falling mains, can be of two types:

- Dry type, which are normally empty of water, and charged by the fire service when needed, and
- Wet type, which are normally kept charged, and are supplied by tanks and pumps within the building.

Provision of fire mains

Some type of fire main must be provided within every firefighting shaft. The provision of firefighting shafts is covered below, but broadly speaking, a firefighting shaft must be provided in every building which has a floor more than 18m above fire brigade access level, or a basement more than 10m below fire brigade access level.

By far the most common type of fire main which is encountered, is the dry rising main, or “dry riser”. It is acceptable to fit a wet main in any building, but because of the expense of providing tanks and pumps, dry mains are fitted wherever possible. It is also not *necessary* to fit wet mains in very tall buildings anyway, because fire brigade pumps are capable of delivering sufficient pressure to provide an adequate firefighting jet even at quite a high level.

In buildings with floors more than 60m above fire brigade access level though, firefighting pumps are at the limit their capability, so wet mains *must* be provided.

A fire brigade inlet will provide the capability of filling up a water tank, but the water is then moved around the building by internal pumps.

Number and location of fire mains

There should be one fire main in every firefighting shaft, and there should be an outlet from the fire main in firefighting shafts, sited in each firefighting lobby.

Note that the location of the inlet can be remote from the shaft.

Design and construction of fire mains

Rather than go into great detail about the design and construction of fire mains in ADB, the reader is referred to sections 2 and 3 of BS 5306: Part 1: 1976 *Fire extinguishing installations and equipment on premises, Hydrant systems, hose reels and foam inlets*.

SECTION 17 - VEHICLE ACCESS

Introduction

Vehicle access to the exterior of a building is needed to enable high rise appliances, to be used, and to enable pumping appliances to supply water and equipment for firefighting and rescue.

Access requirements increase with building size and height.

To enable fire-fighters to enter the building and where in the case of dry mains, a hose connection will be made from the appliance, in buildings fitted with fire mains, pumping appliances need access to the perimeter at points near the inlets.

Buildings not fitted with fire mains

Table 20 of ADB describes the minimum requirements for the amount of vehicle access to buildings which **are not** provided with fire mains. The extent of the access depends on the size and height of the building. Before looking at table 20 though, the reader should first look at situations where Table 20 does not apply.

- Table 20 does not apply to buildings fitted with fire mains.
- Table 20 does not apply to blocks of flats & maisonettes, even if they are not provided with a fire main. This is because there only needs to be access for a pumping appliance to blocks of flats/maisonettes to within 45m of every dwelling entrance door.
- Paragraph 17.12 explains that there are two options available for a building of less than 2000m², and all floors less than 11m above ground level. These are to provide pumping appliance access to either:
 - a. 15% of the perimeter; or
 - b. within 45m of every point on the projected plan area, or 'footprint',whichever is the less onerous
- Table 20 does not apply to single family dwelling houses. This is because there should be vehicle access for a pumping appliance to within 45m of an entrance door.

The table itself is quite simple to understand, although there are a few of things to take careful note of.

- First of all, don't forget that the floor area is the total floor area of the whole building (including galleries?).
- Secondly, when measuring the height of the top storey, either for table 20, or for the exemptions from table 20, notice that the 11m is measured from the ground level, not from the fire service access level. The height of the building from fire service access level is only used as a base to decide whether or not a protected shaft is required.
- Finally, although the table talks about buildings with floors more than 11m, don't forget that if the building is so high that it requires a firefighting shaft (and therefore a fire main), table 20 doesn't apply anyway.

It should be remembered that vehicle access is not just being provided so that fire engines can get close to buildings. The vehicle access is intend to assist firefighting operations inside the building. Consequently, every elevation to which vehicle access is provided

should have a suitable door, not less than 750mm wide, giving access to the interior of the building.

The note to paragraph 17.1 points out that requirements cannot be made under the Building Regulations for work to be done outside the site of the works shown on the deposited plans (upgrading and widening roads for example). In addition, it may not always be possible to upgrade an existing route across a site to a small building such as a single dwelling-house.

In such situations, the Building Control Authority is advised to consult with the Fire Authority to determine a suitable course of action.

Buildings fitted with fire mains

The vehicle access facilities for a building provided with a fire main, are minimal. All that is required is that a pumping appliance can get to within 18m of each fire main inlet connection point, and that the inlet should be visible from the appliance.

In the case of a building fitted with wet mains, the pumping appliance access should be to within 18m, and within sight of, a suitable entrance giving access to the main, **and** in sight of the inlet for the emergency replenishment of the suction tank for the main.

These paragraphs are preceded by a note which basically says that if fire mains have been provided in a building, even though the building is not *required* to have a fire main, then vehicle access to inlets etc, cannot be required. The only vehicle access requirement would be as though the building was not fitted with a fire main.

Having said that, it has just been stated above, that where vehicle access cannot be easily provided, the Building Control Authority is advised to consult with the Fire Authority to determine a suitable course of action. That course of action may be to provide a fire main to inaccessible parts of the building. If fire mains have been provided as a "compensating feature" for poor vehicle access to a low rise building, then clearly fire brigade access to the inlets is essential.

Design of access routes and hard standings

Table 21 Typical fire service vehicle access route specification

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

Table 21 gives some typical specifications for appliances which have to be taken into account when specifying fire brigade vehicle access routes. However, note 1 to this table points out that all fire appliances are different, and guidance should be taken from the fire authority before placing any requirements.

The current trend towards aerial ladder platforms, rather than the 'traditional' hydraulic platforms and turntable ladders is particularly significant. ALP's can exert a particularly high point load under the jacks.



Aerial Ladder Platform (ALP)



Hydraulic Platform (HP)

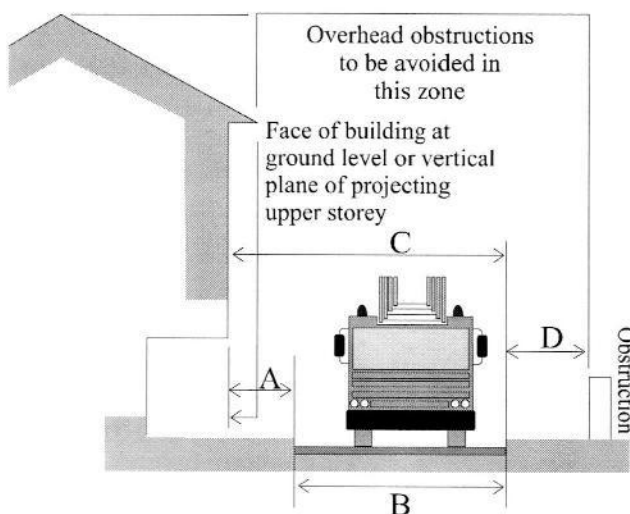
Note 2 to table 21 says that because of the infrequent use of access routes by fire appliances, and because the weight of high rise appliances is distributed over a number of axles, It would be reasonable (even when considering buildings over 11m) "to design the roadbase to 12.5 tonnes, although structures such as bridges should have the full 17 tonnes capacity".

However, it is also necessary to consider the point load generated under the jacks of high rise appliances. Diagram 49, (reproduced below), suggests a figure of 8.3kg/cm² as a point load which should be used. A more accurate figure should be available as part of the local Fire Brigade Policy.

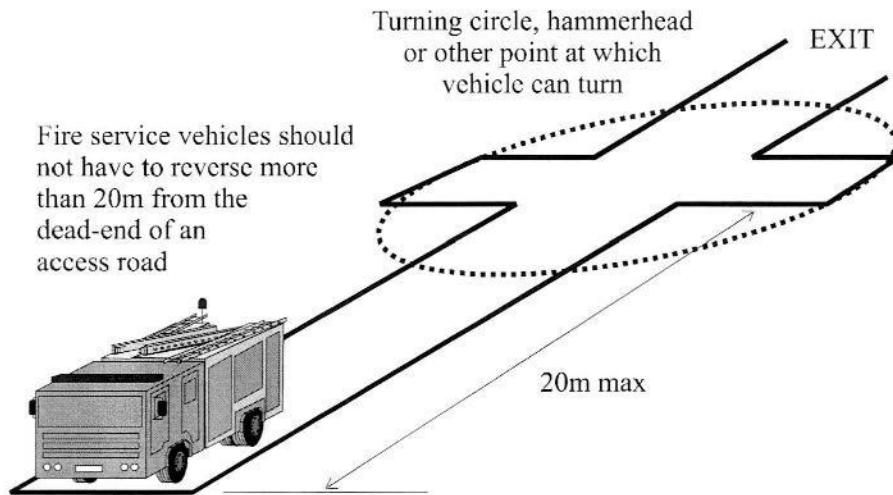
Where access has to be provided for pumping appliances only, all that is required is that a suitable roadway is provided for the specified percentage of the perimeter.

In buildings with a storey over 11m from the ground, the design of the access route is specified in quite a lot of detail:

	TL	HP
A. Maximum distance of near edge of hardstanding from building.	4.9	2.0
B. Minimum width of hardstanding.	5.0	5.5
C. Minimum distance of further edge of hardstanding from building.	10.0	7.5
D. Minimum width of unobstructed space.	NA	2.2



Finally, paragraph 17.11 says that where an access route which is in excess of 20m long terminates in dead-end, turning facilities should be provided. Although it isn't specified in the text, diagram 20 makes it clear that turning facilities do not need to be at the dead-end itself, they just have to be within 20m of the dead-end.

**Building footprint and perimeter.**

The terms "footprint" and "perimeter" are used several times in Section 17. Diagram 48 explains exactly what the terms mean.

Effectively, the footprint of the building can be imagined as being the piece of ground that would stay dry if it rained on a perfectly windless day. The perimeter is the length of the outside edge of the footprint, *minus the length of any walls which are common to other buildings.*

SECTION 18 – ACCESS TO BUILDINGS FOR FIREFIGHTING PERSONNEL

Introduction

In low rise buildings without deep basements, adequate access for firefighters is provided by the vehicle access to the perimeter of the building, and by the normal means of escape inside the building.

In other buildings, reaching the fire, and working inside the building near the fire, necessitates the provision of additional facilities.

These additional facilities may include;

- firefighting lifts,
- firefighting stairs, and
- firefighting lobbies.

These are combined into a protected shaft known as the firefighting shaft. (In this case, the level of protection is that of compartmentation)

Guidance on protected shafts in general is given in Section 9.

Provision of firefighting shafts

There are 3 designs of firefighting shaft described in Section 18, illustrated here below.

Firstly, note that paragraph 18.10 clearly states that:

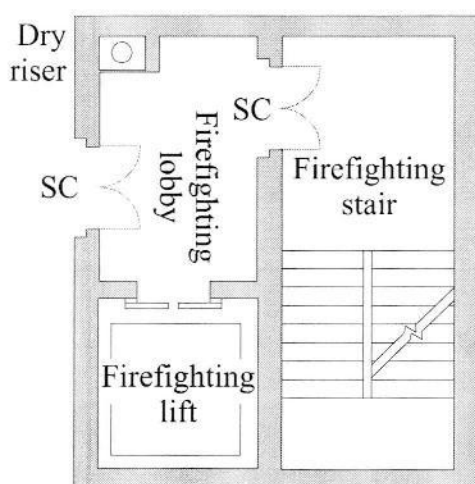
“All firefighting shafts should be equipped with fire mains having outlet connections and valves in every firefighting lobby”.

And that paragraph 16.2 clearly states that:

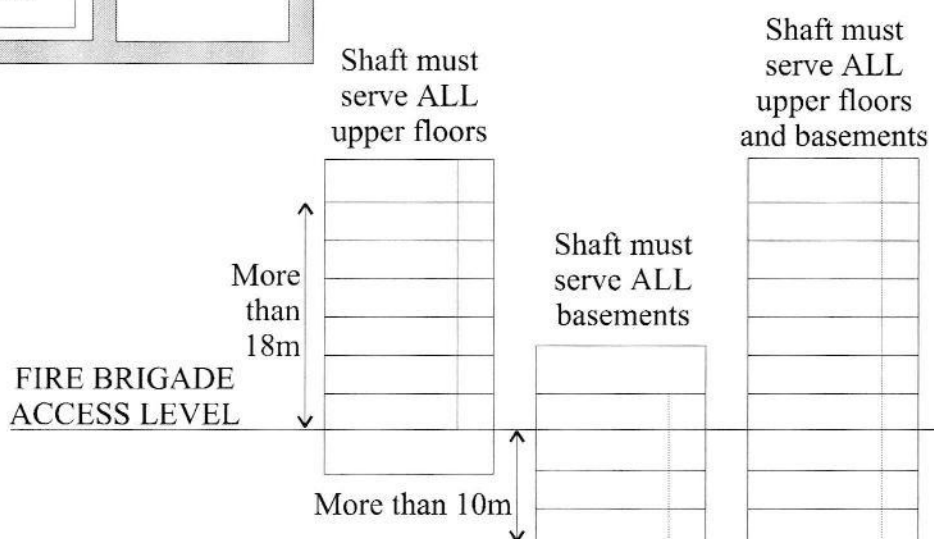
“Buildings provided with firefighting shafts should be provided with fire mains in those shafts”.

It is therefore not clear why Diagram 52 of ADB (which purports to show the components of a firefighting shaft), does not show a fire main.

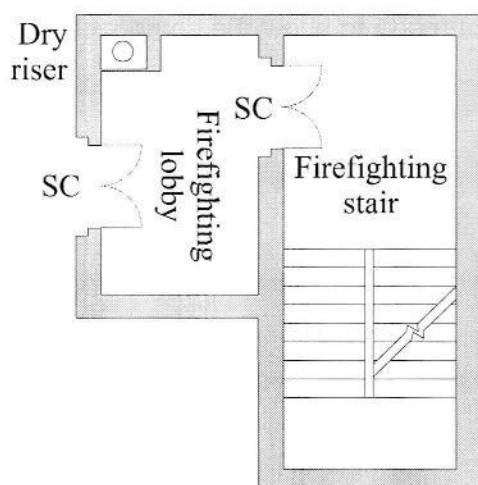
Stair, lobby, and lift



"Buildings with a floor at more than 18m above fire service vehicle access level, or with a basement at more than 10m below fire service vehicle access level, should be provided with firefighting shafts containing firefighting lifts".

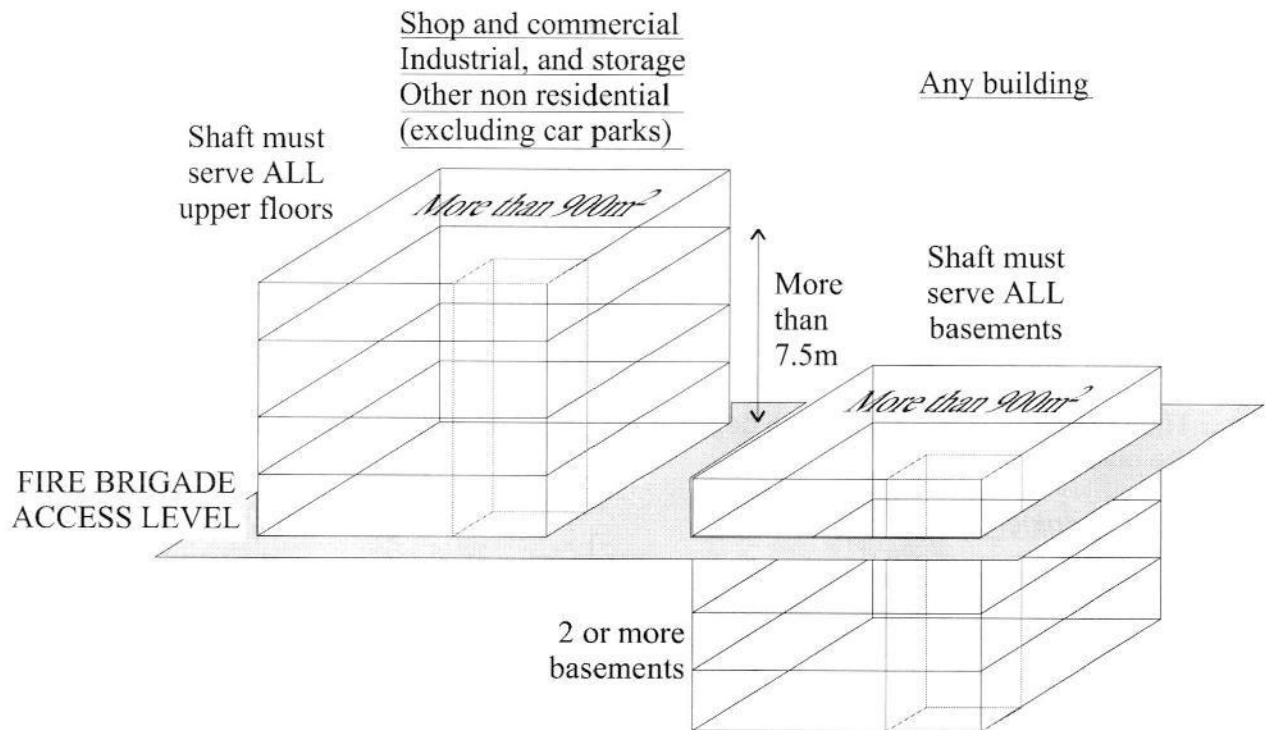


Stairs and lobby only

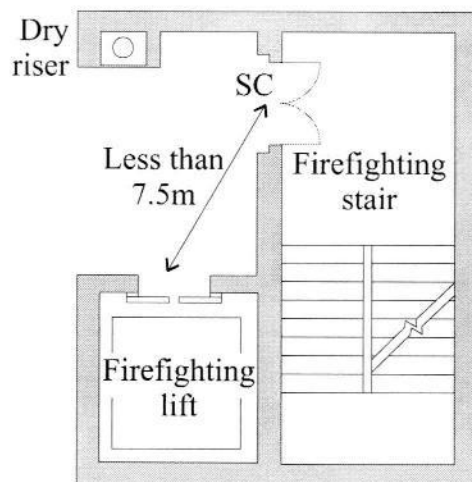


"Buildings in Purpose Groups 4, 6 and 7(a) (Shop and commercial, industrial, and storage & other non residential (excluding car parks), with a storey of 900m² or more in area, where the floor is at a height of more than 7.5m above fire service vehicle access level, should be provided with firefighting shaft(s), which need not include firefighting lifts".

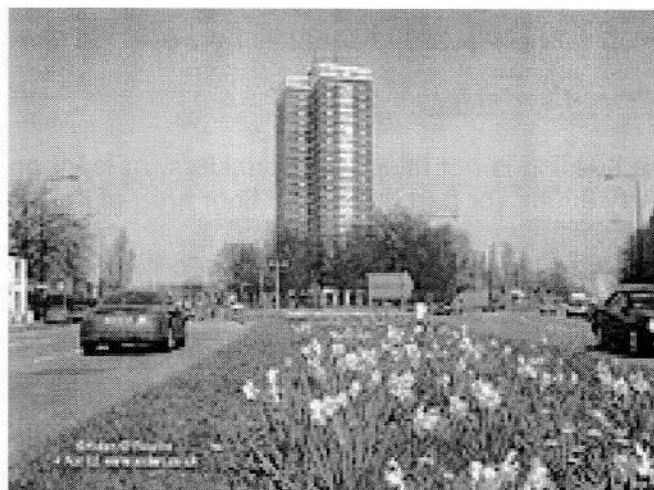
"Buildings with two or more basement storeys, each exceeding 900m² in area, should be provided with firefighting shaft(s), which need not include firefighting lifts".



Stairs and lift only



"Because of the high degree of compartmentation in blocks of flats/ maisonettes,the addition of a firefighting lobby between the firefighting stair(s) and the protected corridor or lobby provided for means of escape purposes is not necessary. Similarly, the firefighting lift can open directly into such protected corridor or lobby, but the firefighting lift landing doors should not be more than 7.5m from the door to the firefighting stair".



Notice from the illustrations above, that if a firefighting shaft is required to serve a basement it need not also serve the upper floors unless they also qualify because of the height or size

of the building. Similarly a shaft serving upper storeys need not serve a basement which is not large or deep enough to qualify in its own right. However a firefighting stair and any firefighting lift should serve all intermediate storeys between the highest and lowest storeys that they do serve.

Shopping complexes are too complicated to be dealt with by ADB, and Section 18 recommends that for guidance on the provision of firefighting shafts in these buildings, the reader should refer to Section 3 of BS 5588: Part 10: 1991 *Fire precautions in the design, construction and use of buildings, Code of practice for shopping complexes*.

Number of firefighting shafts

The number of firefighting shafts depends first of all on whether or not sprinklers are fitted to the building.

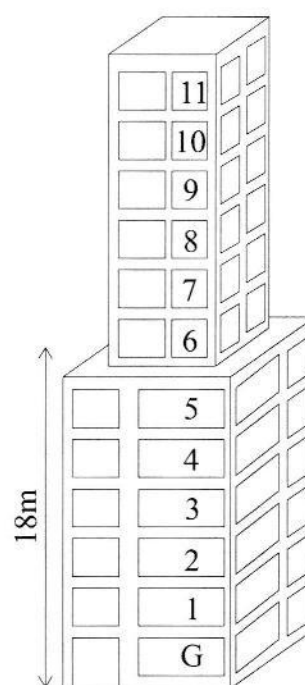
With sprinklers

Table 22 Minimum number of firefighting shafts in buildings fitted with sprinklers

Largest qualifying floor area (m²)	Minimum number of firefighting shafts
less than 900	1
900-2000	2
over 2000	2 plus 1 for every additional 1500m ² or part thereof

It is reasonable to assume that a “qualifying floor” is one of the floors which has caused the building to “qualify” for a firefighting shaft.

For example, the building on the right qualifies for a firefighting shaft by virtue of the fact that floors 6 to 11 are more than 18m above fire service access level. The largest of these “qualifying floors” is 850m². Therefore, the building only requires one firefighting shaft, even though all the lower floors are 1200m².



Without sprinklers

If a building is not fitted with sprinklers, at least one firefighting shaft should be provided for every 900m² (or part thereof) of floor area of the largest floor qualifying floor.

The term “qualifying floor” is not used in paragraph 18.7 b or c, but the text seems to boil down to the same thing.

Location of firefighting shafts

Firefighting shafts must be sited such that every part of every storey (other than at fire service access level) is no more than 60m from a fire main outlet, measured on a route suitable for laying hose. If the internal layout is unknown at the design stage, then this distance is reduced to 40m (²/₃ of 60m).

Notice that the number of shafts depends on the size of the largest qualifying floor, and yet every part of every floor must be within 60m/40m of a fire main outlet.

Design and construction of firefighting shafts

All of the detail contained in ADB about the design and construction of firefighting shafts is contained in the diagrams shown previously. ADB only goes on to say that detailed information about planning and construction, firefighting lift installation, and electrical services, can be found in BS 5588: Part 5: 1991 *Code of practice for firefighting stairs and lifts*.

However, this standard has been superseded since the publication of ADB. The current edition of BS 5588 Part 5, is 2004, *Access and facilities for fire-fighting*. Additionally, this new standard states that one of the principal changes in the new edition is the removal of all recommendations relating to fire-fighting lifts. They are now covered in BS EN 81-72¹;

Rolling shutters in compartment walls

"Rolling shutters should be capable of being opened and closed manually by the fire service".

This has absolutely nothing to do with firefighting shafts. It is dropped in at paragraph 18.13 because Section 18 is about access to buildings for firefighting personnel.

¹ BS EN 81-72:2003: Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts. Firefighters lifts

SECTION 19 – VENTING OF HEAT AND SMOKE FROM BASEMENTS

Introduction

Smoke outlets (also referred to as smoke vents) provide a route for heat and smoke to escape to the open air from the basement level(s), and to allow cooler air in.

Provision of smoke outlets

Smoke vents from basements are not required in the following cases:

- a. a basement in a single family dwellinghouse.
- b. any basement storey that has:
 - i. a floor area of not more than 200m², and
 - ii. a floor not more than 3m below the adjacent ground level.
- c. a strong room
- d. where basements have external doors or windows, the compartments containing the rooms with these doors or windows do not need smoke outlets.

Where practicable each *basement space* should have one or more smoke outlets. Where this isn't practicable, it is acceptable to have some spaces without vents, as long as there is facility for the fire service to vent the whole basement sequentially. Each basement storey should have its own smoke outlet connected directly to open air.

However, if a basement is compartmented, each compartment should have direct access to venting, without having to open doors etc into another compartment.

Natural smoke outlets

- *"Smoke outlets should be sited at high level, either in the ceiling or in the wall of the space they serve. They should be evenly distributed around the perimeter to discharge in the open air outside the building".*

In reality, it is likely that the exact location of outlets would be determined by the building geometry, and the availability of external walls.

- *"The combined clear cross-sectional area of all smoke outlets should not be less than 1/40th of the floor area of the storey they serve".*
- *"Separate outlets should be provided from places of special fire hazard".*
- *"If the outlet terminates at a point that is not readily accessible, it should be kept unobstructed and should only be covered with a non-combustible grille or louvre".*

i.e. The preferred option, is that the smoke outlet should be permanently open to the outside, with only a grill or louvre for security.

- The second best alternative, is that the outlet may be covered with a *"panel, stallboard or pavement light which can be broken out or opened"* if it is in a readily accessible position. If this option is taken, the position of the covered outlets should be suitably indicated.
- Outlets should not be placed where smoke issuing from them would prevent the use of escape routes from the building.

Mechanical smoke extract

A system of mechanical extraction may be provided as an alternative to natural venting *provided that the basement storey(s) are fitted with a sprinkler system.*

The majority (if not all) standards for sprinkler systems require that if a sprinkler system is fitted, then the whole building must be covered, not just a part. However ADB states that if sprinklers are fitted in a basement simply as a supplement to a mechanical smoke ventilation system, then *"it is not considered necessary....to install sprinklers on the storeys other than the basement(s)".*

Basement car parks are not normally expected to be fitted with sprinklers, even if ventilation is by mechanical means. The theory is that fire spread between cars is unlikely. This theory was tested prior to the commissioning of the Channel Tunnel rail network, to confirm the safety of the carriages. Having said that, it is common knowledge that there is a big difference between fire spread in cars parked end to end in a train carriage, and cars parked side by side in a car park with a low ceiling.

Car parks are dealt with in more detail in Section 12 of ADB.

A mechanical smoke extraction system should give at least 10 air changes per hour and should be capable of handling gas temperatures of 300°C for not less than one hour. It should come into operation automatically on activation of either the sprinkler system, or a fire detection system.

Construction of outlet ducts or shafts

Paragraph 19.16 states that *"where there are natural smoke outlet shafts from different compartments of the same basement storey, or from different basement storeys, they should be separated from each other by non-combustible construction having not less fire resistance than the storey(s) they serve".*

The purpose of this recommendation is clear. The smoke outlet shafts connect directly to the compartments they serve. If two such shafts run side by side without adequate fire separation between them, there is a danger that fire could spread from one compartment to another.

Finally, *"outlet ducts or shafts, including any bulkheads over them (see Diagram below), should be enclosed in non-combustible construction having not less fire resistance than the element through which they pass".*

