



HM Government

## The Building Regulations 2010

**Fire safety**

**APPROVED DOCUMENT**

**B**

### **Volume 1: Dwellings**

**Requirement B1: Means of warning and escape**

**Requirement B2: Internal fire spreading (linings)**

**Requirement B3: Internal fire spread (structure)**

**Requirement B4: External fire spread**

**Requirement B5: Access and facilities for the fire service**

XXXX edition – for use in England\*

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\* This approved document gives guidance for compliance with the Building Regulations for building work carried out in England. It also applies to building work carried out on excepted energy buildings in Wales as defined in the Welsh Ministers (Transfer of Functions) (No.2) Order 2009.

# The approved documents

## What is an approved document?

The Secretary of State has approved a series of documents that give practical guidance about how to meet the requirements of the Building Regulations 2010 for England. Approved documents give guidance on each of the technical parts of the regulations and on regulation 7 (see the back of this document).

Approved documents set out what, in ordinary circumstances, may be accepted as reasonable provision for compliance with the relevant requirements of the Building Regulations to which they refer. If you follow the guidance in an approved document, there will be a presumption of compliance with the requirements covered by the guidance. However, compliance is not guaranteed; for example, 'normal' guidance may not apply if the particular case is unusual in some way.

Note that there may be other ways to comply with the requirements – *there is no obligation to adopt any particular solution contained in an approved document*. If you prefer to meet a relevant requirement in some other way than described in an approved document, you should discuss this with the relevant building control body.

In addition to guidance, some approved documents include provisions that must be followed exactly, as required by regulations or where methods of test or calculation have been prescribed by the Secretary of State.

Each approved document relates only to the particular requirements of the Building Regulations that the document addresses. However, building work must also comply with any other applicable requirements of the Building Regulations.

## How to use this approved document

This document uses the following conventions.

- a. **Text against a green background** is an extract from the Building Regulations 2010 or the Building (Approved Inspectors etc.) Regulations 2010 (both as amended). These extracts set out the legal requirements of the regulations.
- b. **Key terms, printed in green**, are defined in Appendix A.
- c. References are made to appropriate standards or other documents, which can provide further useful guidance. When this approved document refers to a named standard or other reference document they have been clearly identified in the document. Standards are highlighted in bold throughout. The full name and version of the document referred to is listed in Appendix E (standards) or Appendix F (other documents). However, if the issuing body has revised or updated the listed version of the standard or document, you may use the new version as guidance if it continues to address the relevant requirements of the Building Regulations.

**NOTE:** Standards and technical approvals may also address aspects of performance or matters that are not covered by the Building Regulations, or they may recommend higher standards than required by the Building Regulations.

## Where you can get further help

If you do not understand the technical guidance or other information in this approved document or the additional detailed technical references to which it directs you, you can seek further help through a number of routes, some of which are listed below.

- a. *If you are the person undertaking the building work:* either from your local authority building control service or from an approved inspector.
- b. *If you are registered with a competent person scheme:* from the scheme operator.
- c. *If your query is highly technical:* from a specialist or an industry technical body for the relevant subject.

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# The Building Regulations

The following is a high level summary of the Building Regulations relevant to most types of building work. Where there is any doubt you should consult the full text of the regulations, available at [www.legislation.gov.uk](http://www.legislation.gov.uk).

## Building work

Regulation 3 of the Building Regulations defines ‘building work’. Building work includes:

- a. the erection or extension of a building
- b. the provision or extension of a controlled service or fitting
- c. the material alteration of a building or a controlled service or fitting.

Regulation 4 states that building work should be carried out in such a way that, when work is complete:

- a. For new buildings or work on a building that complied with the applicable requirements of the Building Regulations: the building complies with the applicable requirements of the Building Regulations.
- b. For work on an existing building that did not comply with the applicable requirements of the Building Regulations:
  - i. the work itself must comply with the applicable requirements of the Building Regulations
  - ii. the building must be no more unsatisfactory in relation to the requirements than before the work was carried out.

## Material change of use

Regulation 5 defines a ‘material change of use’ in which a building or part of a building that was previously used for one purpose will be used for another.

The Building Regulations set out requirements that must be met before a building can be used for a new purpose. To meet the requirements, the building may need to be upgraded in some way.

## Materials and workmanship

In accordance with regulation 7, building work must be carried out in a workmanlike manner using adequate and proper materials. Guidance on materials and workmanship is given in Approved Document 7.

## Energy efficiency requirements

Part 6 of the Building Regulations imposes additional specific requirements for energy efficiency.

If a building is extended or renovated, the energy efficiency of the existing building or part of it may need to be upgraded.

## Notification of work

Most building work and material changes of use must be notified to a building control body unless one of the following applies.

- a. It is work that will be self-certified by a registered competent person or certified by a registered third party.
- b. It is work exempted from the need to notify by regulation 12(6A) of, or Schedule 4 to, the Building Regulations.

## Responsibility for compliance

People who are responsible for building work (e.g. agent, designer, builder or installer) must ensure that the work complies with all applicable requirements of the Building Regulations. The building owner may also be responsible for ensuring that work complies with the Building Regulations. If building work does not comply with the Building Regulations, the building owner may be served with an enforcement notice.

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# Section 0: Approved Document B: Fire safety – dwellings

## Summary

**0.1** This approved document has been published in two volumes. Volume 1 deals solely with **dwellings**, including blocks of **flats**, while Volume 2 deals with all other types of **building** covered by the Building Regulations.

## Arrangement of sections

**0.2** Requirements B1–B5 of Schedule 1 to the Building Regulations are dealt with separately in one or more sections. Each requirement is shown at the start of the relevant sections.

**0.3** The provisions in this document have the following aims.

**Requirement B1:** When there is a fire, ensure satisfactory means of:

- a. sounding an alarm
- b. escape for people.

**Requirement B2:** Inhibit the spread of fire over internal linings of **buildings**.

**Requirement B3:** The **building** must be built such that in the event of a fire:

- a. the premature collapse of the **building** is avoided
- b. sufficient fire separation is provided within **buildings** and between adjoining **buildings**
- c. automatic fire suppression is provided where necessary
- d. the restriction of unseen spread of fire and smoke in **concealed spaces**.

**Requirement B4:** Restrict:

- a. the potential for fire to spread over **external walls** and roofs
- b. the spread of fire from one **building** to another.

**Requirement B5:** Ensure both:

- a. satisfactory access for the fire service and its appliances
- b. facilities in **buildings** to help firefighters save the lives of people in and around **buildings**.

**Regulation 38:** Provide fire safety information to **building** owners.

**0.4** Guidance is given on each aspect separately, though many are closely interlinked. The document should be considered as a whole package aimed at achieving fire safety. The relationship between different requirements should be recognised; a higher standard under one requirement may benefit one or more other requirements.

## Appendices: Information common to more than one requirement of Part B

**0.5** Guidance on matters that refer to more than one section of this document can be found in the following appendices.

Appendix A: Key terms

Appendix B: Performance of materials, products and structures

Appendix C: Fire doorsets

Appendix D: Methods of measurement

Appendix E: Standards referred to

Appendix F: Other documents referred to

## Management of premises

**0.6** The Building Regulations do not impose any requirements on the management of a **building**, but do assume that it will be properly managed.

Appropriate fire safety design considers the way in which a **building** will be managed. Any reliance on an unrealistic or unsustainable management regime cannot be considered to have met the requirements of the regulations.

Once the **building** is in use, the management regime should be maintained and a suitable risk assessment undertaken for any variation in that regime. Failure to take proper management responsibility may result in the prosecution of an employer, **building** owner or occupier under legislation such as the Regulatory Reform (Fire Safety) Order 2005.

## Inclusive design

**0.7** The fire safety aspects of the Building Regulations aim to achieve reasonable standards of health and safety for people in and around **buildings**.

People, regardless of disability, age or gender, should be able to access **buildings** and use their facilities. The fire safety measures incorporated into a **building** should take account of the needs of everyone who may access the **building**, both as visitors and as people who live or work in it. It is not appropriate, except in exceptional circumstances, to assume that certain groups of people will be excluded from a **building** because of its use.

The provisions in this approved document are considered to be of a reasonable standard for most **buildings**. However, some people's specific needs might not be addressed. In some situations, additional measures may be needed to accommodate these needs. This should be done on a case-by-case basis.

## Alternative approaches

**0.8** The fire safety requirements of the Building Regulations will probably be satisfied by following the relevant guidance in this approved document. However, approved documents provide guidance for some common **building** situations, and there may be alternative ways of complying with the requirements.

If other codes or guides are adopted, the relevant fire safety recommendations in that publication should be followed, rather than a mix of recommendations in the publication and provisions in the relevant sections of this approved document. However, in some circumstances it may be necessary to use one publication to supplement another.

Guidance documents intended specifically for assessing fire safety in existing buildings often include less onerous provisions than those set out in this approved document or in other standards for new buildings. As such, documents for assessing fire safety in existing buildings are unlikely to be appropriate for building work that is controlled by the regulations.

## Purpose groups

- 0.9** Building uses are classified within different **purpose groups**, which represent different levels of hazard (see Table 0.1). A **purpose group** can apply to a whole **building** or a **compartment** within the **building**, and should relate to the main use of the **building** or **compartment**.
- 0.10** Where a **building** or **compartment** has more than one use, it is appropriate to assign each different use to its own **purpose group** in the following situations.
- a. If the ancillary use is a **flat**.
  - b. If both of the following apply.
    - i. The **building** or **compartment** has an area of more than 280m<sup>2</sup>.
    - ii. The ancillary use relates to an area that is more than one-fifth of the total floor area of the **building** or **compartment**.
  - c. In **buildings** or **compartments** in **purpose group 4**, if the ancillary use is storage and both of the following apply.
    - i. The **building** or **compartment** has an area of more than 280m<sup>2</sup>.
    - ii. The storage area comprises more than one-third of the total floor area of the **building** or **compartment**.
- 0.11** Where there are multiple main uses that are not ancillary to one another (for example, shops with independent offices above), each use should be assigned to a **purpose group** in its own right.
- 0.12** Where a complex mix of uses exists, the risk that one use may have on another should be considered. Special measures to reduce the risk may be necessary.

**Table 0.1 Classification of purpose groups**

Title	Group	Purpose for which the building or compartment of a building is intended to be used
Residential (dwellings)	1(a)*	Flat.
	1(b)†	Dwellinghouse that contains a habitable storey with a floor level a minimum of 4.5m above ground level.
	1(c)†+	Dwellinghouse that does not contain a habitable storey with a floor level a minimum 4.5m above ground level.
Residential (institutional)	2(a)	Hospital, home, school or other similar establishment, where people sleep on the premises. The building may be either of the following. <ul style="list-style-type: none"> <li>• Living accommodation for, or accommodation for the treatment, care or maintenance of, either:               <ul style="list-style-type: none"> <li>– people suffering from disabilities due to illness or old age or other physical or mental incapacity</li> <li>– people under the age of 5 years.</li> </ul> </li> <li>• A place of lawful detention.</li> </ul>
Residential (other)	2(b)	Hotel, boarding house, residential college, hall of residence, hostel or any other residential purpose not described above.

**Table 0.1 Continued**

Title	Group	Purpose for which the building or compartment of a building is intended to be used
Office	3	Offices or premises used for any of the following and their control: <ul style="list-style-type: none"><li>• administration</li><li>• clerical work (including writing, bookkeeping, sorting papers, filing, typing, duplicating, machine calculating, drawing and the editorial preparation of matter for publication, police and fire and rescue service work)</li><li>• handling money (including banking and building society work)</li><li>• communications (including postal, telegraph and radio communications)</li><li>• radio, television, film, audio or video recording</li><li>• performance (premises not open to the public).</li></ul>
Shop and commercial	4	Shops or premises used for either of the following. <ul style="list-style-type: none"><li>• A retail trade or business (including selling food or drink to the public for immediate consumption, retail by auction, self-selection and over-the-counter wholesale trading, the business of lending books or periodicals for gain, the business of a barber or hairdresser, and the rental of storage space to the public).</li><li>• Premises to which the public are invited either:<ul style="list-style-type: none"><li>– to deliver or collect goods in connection with their hire, repair or other treatment</li><li>– (except in the case of repair of motor vehicles) where the public themselves may carry out such repairs or other treatments.</li></ul></li></ul>
Assembly and recreation	5	Place of assembly, entertainment or recreation, including any of the following: <ul style="list-style-type: none"><li>• bingo halls, broadcasting, recording and film studios open to the public, casinos, dance halls</li><li>• entertainment, conference, exhibition and leisure centres</li><li>• funfairs and amusement arcades</li><li>• museums and art galleries, non-residential clubs, theatres, cinemas, concert halls</li><li>• educational establishments, dancing schools, gymnasia, swimming pool buildings, riding schools, skating rinks, sports pavilions, sports stadia</li><li>• law courts</li><li>• churches and other buildings of worship, crematoria</li><li>• libraries open to the public, non-residential day centres, clinics, health centres and surgeries</li><li>• passenger stations and termini for air, rail, road or sea travel</li><li>• public toilets</li><li>• zoos and menageries.</li></ul>
Industrial	6	Factories and other premises used for any of the following: <ul style="list-style-type: none"><li>• manufacturing, altering, repairing, cleaning, washing, breaking up, adapting or processing any article</li><li>• generating power</li><li>• slaughtering livestock.</li></ul>
Storage and other non-residential+	7(a)	Either of the following: <ul style="list-style-type: none"><li>• place (other than described under 7(b)) for the storage or deposit of goods or materials</li><li>• any building not within purpose groups 1 to 6.</li></ul>
	7(b)	Car parks designed to admit and accommodate only cars, motorcycles and passenger or light goods vehicles that weigh a maximum of 2500kg gross.

**Table 0.1 Continued**

Title	Group	Purpose for which the building or compartment of a building is intended to be used
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**NOTES:**

This table only applies to Part B.

\* Includes live/work units that meet the provisions of AD B Volume 1, paragraph 3.21.

† Includes any surgeries, consulting rooms, offices or other accommodation that meets all of the following conditions.

a. A maximum of 50m<sup>2</sup> in total.

b. Part of a dwellinghouse.

c. Used by an occupant of the dwellinghouse in a professional or business capacity.

+ All of the following are included in purpose group 1(c).

a. A detached garage not more than 40m<sup>2</sup> in area.

b. A detached open carport of not more than 40m<sup>2</sup> in area.

c. A detached building that consists of a garage and open carport, each a maximum of 40m<sup>2</sup> in area.

## Sprinkler systems

**0.13** Blocks of flats with a floor more than 30m above ground level should be fitted with a sprinkler system in accordance with paragraph 0.14.

**NOTE:** Sprinklers need only be provided within the individual flats, they are not required in the common areas such as stairs, corridors or landings. For the purposes of this paragraph the limit on the scope of **BS 9251** to buildings below 20m in height can be ignored.

**0.14** Where required, sprinkler systems should be provided throughout the **building**, unless acting as a compensatory feature to address a specific risk. They should be designed and installed in accordance with the following.

a. **BS 9251** and **BS 9252**.

b. For **dwelling**s outside the scope of **BS 9251**, in accordance with the requirements of either of the following.

i. **BS 5306-2**, including the relevant hazard classification together with the additional requirements for life safety.

ii. **BS EN 12845**, including the relevant hazard classification together with the special requirements for life safety systems.

Any sprinkler system installed to satisfy the requirements of Part B of the Building Regulations should be regarded as a life safety system. However, there may be some circumstances in which a life safety requirement specified in **BS 5306-2** or **BS EN 12845** is inappropriate or unnecessary.

Further guidance can also be found in the BAFSA's *Sprinklers for Safety: Use and Benefits of Incorporating Sprinklers in Buildings and Structures*.

If the provisions in a **building** vary from those in this document, sprinkler protection can also sometimes be used to compensate.

Alternative fire suppression systems are available. They should be designed and tested for use in **buildings** and be fit for their intended purpose.

# Requirement B1: Means of warning and escape

These sections deal with the following requirement from Part B of Schedule 1 to the Building Regulations 2010.

Requirement	
<i>Requirement</i>	<i>Limits on application</i>
<p><b>Means of warning and escape</b></p> <p><b>B1.</b> The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times.</p> <p>(a) 1952 c.52; section 33 was amended by section 100 of the Criminal Justice and Public Order Act 1994 (c.33) and by S.I. 1963/597.</p>	<p>Requirement B1 does not apply to any prison provided under section 33 of the Prison Act 1952<sup>(a)</sup> (power to provide prisons, etc.).</p>

## Intention

In the Secretary of State's view, requirement B1 is met by achieving all of the following.

- All people in the **building** are given early warning of fire.
- All people can escape to a safe place without external assistance.
- Escape routes** are well located and of sufficient capacity.
- Where necessary, **escape routes** are protected from the effects of fire.

Building work and material changes of use subject to requirement B1 include both new and existing **buildings**.



# Section 1: Fire detection and fire alarm systems

## General

- 1.1 All new **dwelling**s should have a fire detection and **fire alarm system**, minimum Grade D Category LD3 standard, in accordance with the relevant recommendations of **BS 5839-6**.

A higher standard of protection should be considered where occupants of a proposed **dwelling** would be at special risk from fire. Further advice on this is also given in **BS 5839-6**.

- 1.2 Smoke alarms should be mains operated and conform to **BS EN 14604**.
- 1.3 Heat alarms should be mains operated and conform to **BS 5446-2**.
- 1.4 Smoke and heat alarms should have a standby power supply, such as a battery (rechargeable or non-rechargeable) or capacitor. More information on power supplies is given in clause 15 of **BS 5839-6**.

## Large houses

- 1.5 A large **dwelling** has more than one **storey**, and at least one **storey** exceeds 200m<sup>2</sup>.
- 1.6 A large **dwelling** of two **storeys** (excluding **basement storeys**) should be fitted with a Grade B Category LD3 fire detection and alarm system, as described in **BS 5839-6**.
- 1.7 A large **dwelling** of three or more **storeys** (excluding **basement storeys**) should be fitted with a Grade A Category LD2 fire detection and alarm system as described in **BS 5839-6**.

## Extensions and alterations

- 1.8 A fire detection and **fire alarm system** should be installed in new **habitable rooms** to which either of the following applies.

- a. The **room** is provided above ground floor level.
- b. The **room** is provided at ground floor level, without a **final exit**.

Smoke alarms should be provided in the **circulation spaces** of the **dwelling** in accordance with paragraphs 1.1 to 1.4.

## Blocks of flats

- 1.9 Each **flat** in a block should have alarms as set out in paragraphs 1.1 to 1.4. With effective compartmentation, a communal **fire alarm system** is not normally needed. In some **buildings**, detectors in common parts of the **building** may need to operate smoke control or other fire protection systems but don't usually sound an audible warning.

## Student accommodation

- 1.10** In student residences that are designed and occupied as a block of flats, separate automatic detection should be provided in each self-contained flat where all of the following apply.
- A group of up to six students shares the flat.
  - Each flat has its own entrance door.
  - The compartmentation principles for flats in section 7 have been followed.

Where a total evacuation is required, the alarm system should follow the guidance for buildings other than flats in Volume 2 of Approved Document B.

## Supervised sheltered housing

- 1.11** The fire detection equipment should connect to a central monitoring point or alarm receiving centre. It should alert the warden or supervisor and identify the individual flat where a fire has been detected.
- 1.12** These provisions do not apply to the following, and means of warning should follow the guidance for buildings other than flats in Volume 2 of Approved Document B.
- The common parts of a sheltered housing development, such as communal lounges.
  - Sheltered accommodation in the 'institutional' or 'other residential' purpose groups.

## Section 2: Means of escape – houses

### Escape from the ground storey

- 2.1 See diagram 2.1a. All **habitable rooms** (excluding kitchens) should have either of the following.
- An opening directly onto a hall leading to a **final exit**.
  - An emergency egress window or door, as described in paragraph 2.10.

**NOTE:** Ground level is explained in Appendix D, diagram D4.

### Escape from upper storeys a maximum of 4.5m above ground level

- 2.2 See diagram 2.1b. Where served by only one stair, all **habitable rooms** (excluding kitchens) should have either of the following.
- An emergency egress window or external door, as described in paragraph 2.10.
  - Direct access to a **protected stairway**, as described in paragraph 2.5a.
- 2.3 Two **rooms** may be served by a single window. A door between the **rooms** should provide access to the window without passing through the stair enclosure. Both **rooms** should have their own access to the internal stair.

### Escape from upper storeys more than 4.5m above ground level

- 2.4 **Dwellings** with one internal stair should comply with paragraphs 2.5 and 2.6. In **dwellings** with more than one stair, the stairs should provide effective alternative **means of escape**. The stairs should be physically separated by either of the following.
- Fire resisting** construction (minimum REI 30).
  - More than one **room**.

### Dwellings with one storey more than 4.5m above ground level

- 2.5 See diagram 2.1c. The **dwelling** should have either of the following.
- Protected stairway** – a staircase of **fire resisting** construction (minimum REI 30) at all **storeys**, that either:
    - extends to a **final exit** (diagram 2.2a)
    - gives access to a minimum of two ground level **final exits** that are separated from each other by **fire resisting** construction (minimum REI 30) and **fire doorsets** (minimum E 30 S<sub>a</sub>) (diagram 2.2b).

**Cavity barriers** or a **fire resisting ceiling** (minimum EI 30) should be provided above a **protected stairway** enclosure (diagram 2.3).

- b. **Alternative escape** – a top storey separated from lower storeys by fire resisting construction (minimum REI 30) and with an alternative escape route leading to its own final exit.

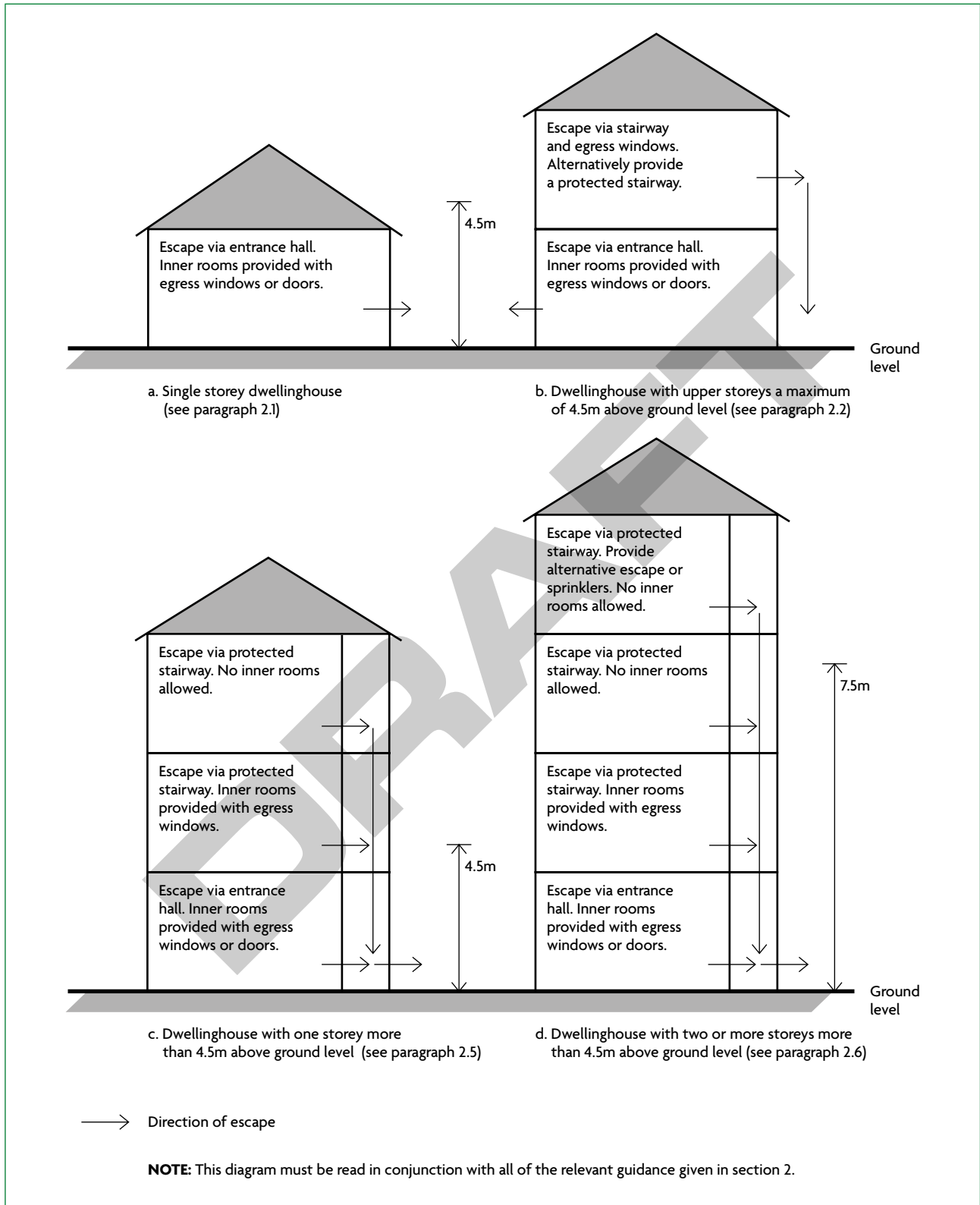


Diagram 2.1 Means of escape from dwellings

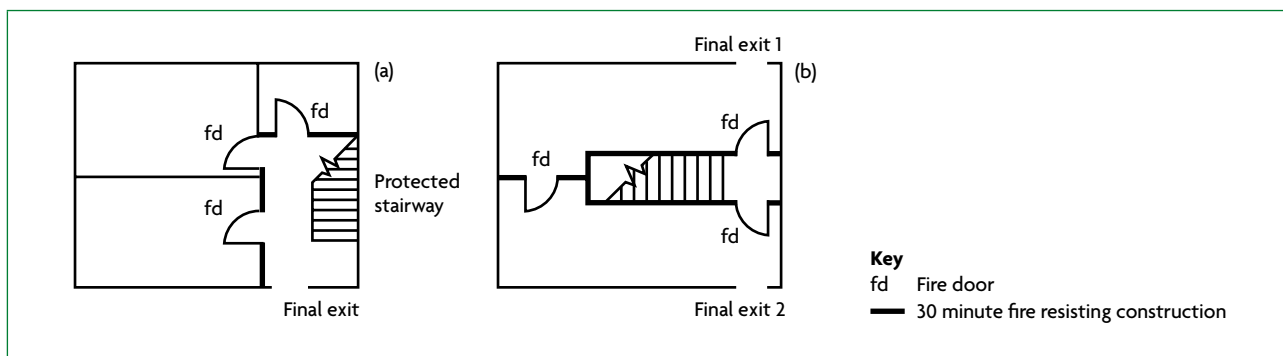


Diagram 2.2 Alternative arrangements for final exits

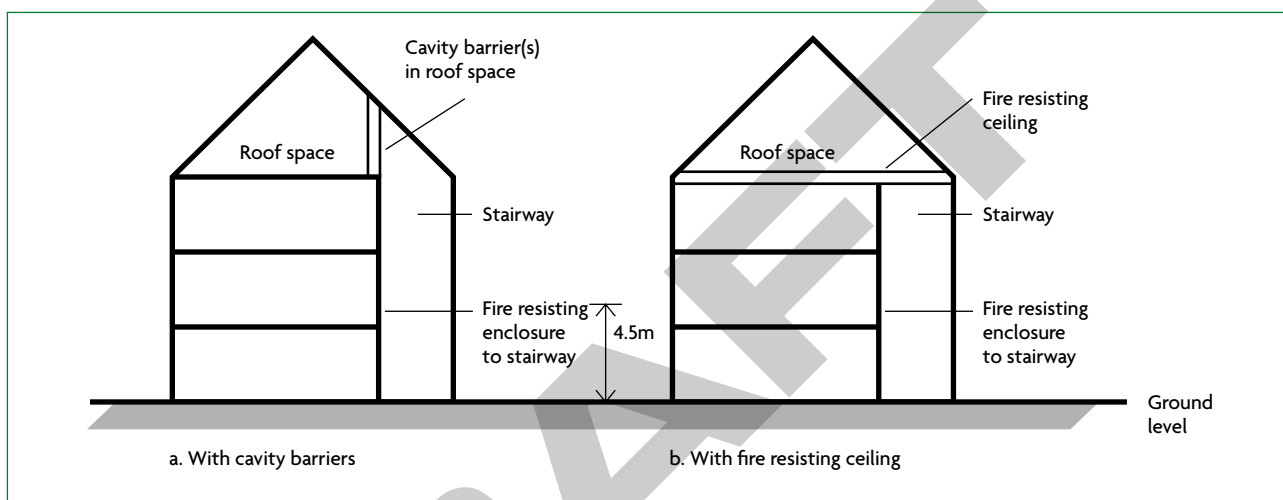
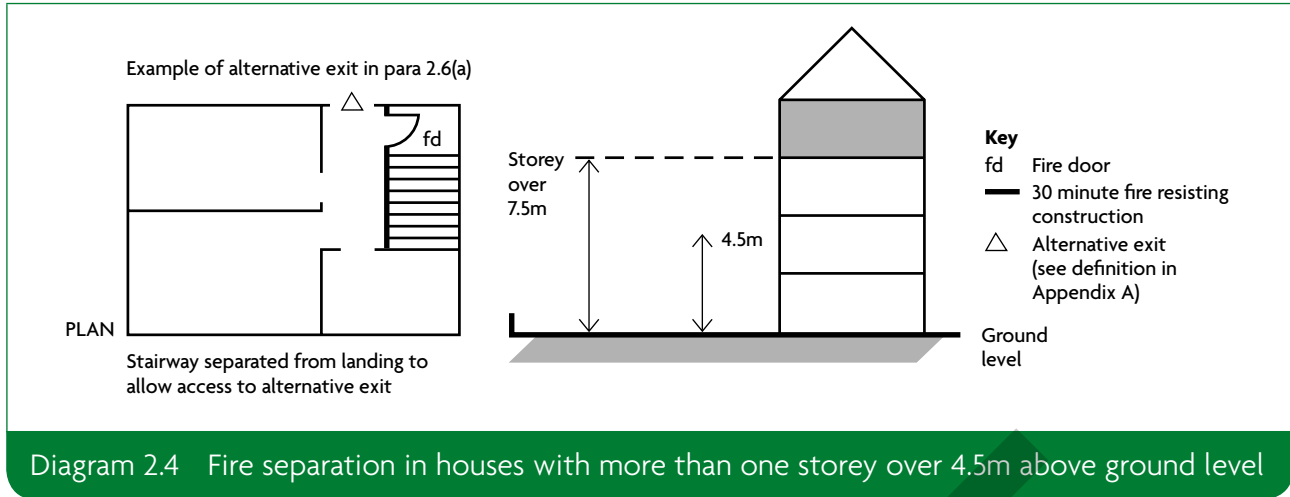


Diagram 2.3 Alternative cavity barrier arrangements in roof space over protected stairway in a house with a storey more than 4.5m above ground level

## Dwellings with two or more storeys more than 4.5m above ground level

**2.6** See diagram 2.1d. In addition to meeting the provisions in paragraph 2.5, the dwelling should comply with both of the following.

- a. Provide an **alternative escape route** from each **storey** more than 7.5m above ground level. At the first storey above 7.5m, the **protected stairway** should be separated from the lower **storeys** by **fire resisting** construction (minimum REI 30) if the **alternative escape route** is accessed via either of the following.
  - i. The **protected stairway** to an upper **storey**.
  - ii. A landing within the **protected stairway** enclosure to an alternative **escape route** on the same **storey**. In addition, the protected stairway at or about 7.5m above ground level should be separated from the lower storeys or levels by fire resisting construction (see diagram 2.4).
- b. Provide a sprinkler system throughout, designed and installed in accordance with **BS 9251**.



## Passenger lifts

- 2.7** A passenger lift serving any storey more than 4.5m above ground level should be in either of the following.
- The enclosure to the protected stairway, as described in paragraph 2.5.
  - A fire resisting lift shaft (minimum REI 30).

## Air circulation systems

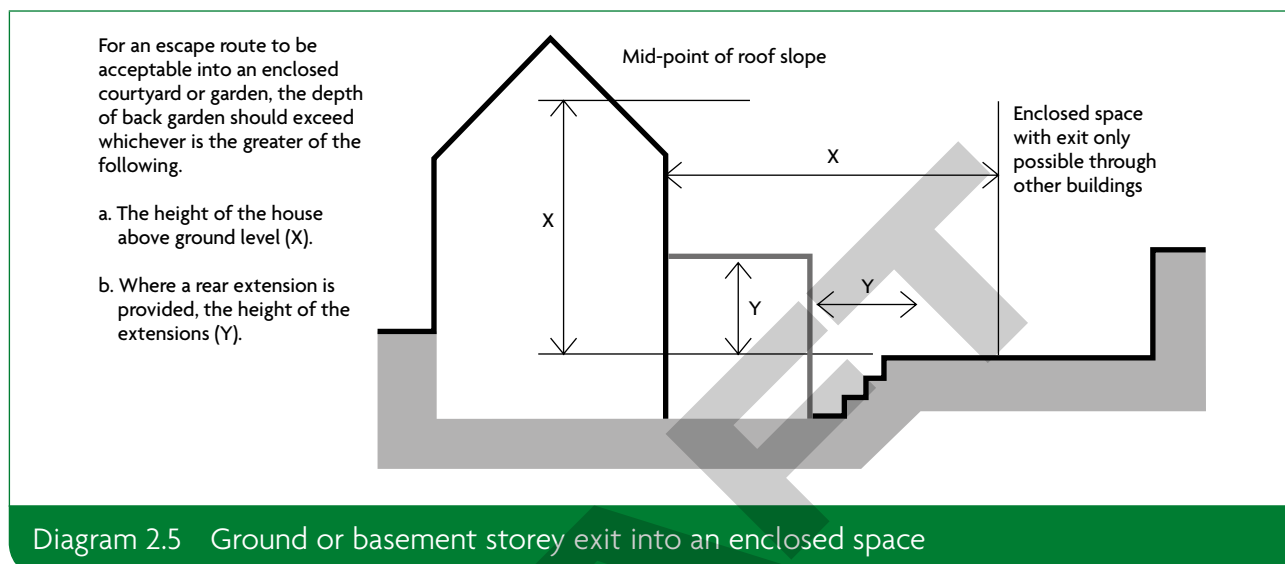
- 2.8** Ventilation ducts passing through compartment walls into another building should comply with the guidance in section 9 of Approved Document B Volume 2.
- 2.9** All of the following precautions should be taken to avoid smoke and fire spread to the protected stairway.
- Ventilation grilles should not be fitted in any wall, door, floor or ceiling of the enclosure.
  - Any duct passing through the enclosure should be rigid steel. Joints between the ductwork and enclosure should be fire-stopped.
  - Ducts serving the enclosure should not serve any other areas.
  - Mechanical ventilation systems that recirculate air and serve both the enclosure and other areas should shut down upon detecting smoke in the system.
  - For ducted warm air heating systems, a room thermostat should be sited in the living room. It should be mounted at a height between 1370mm and 1830mm above the floor. The maximum setting should be 27°C.

## General provisions

### Emergency egress windows and external doors

- 2.10** Windows or external doors providing emergency escape should comply with all of the following.
- Windows should have an unobstructed openable area that complies with all of the following.
    - A minimum area of 0.33m<sup>2</sup>.
    - A minimum height of 450mm and a minimum width of 450mm (may be measured at an angle).

- iii. The bottom of the openable area is a maximum of 1100mm above the floor.
- b. People escaping should be able to reach a place free from danger from fire. Courtyards or inaccessible back gardens should comply with diagram 2.5.
- c. Locks (with or without removable keys) and opening stays (with child-resistant release catches) may be fitted to escape windows.
- d. Windows should remain open without being held.



## Inner rooms

- 2.11** An inner room is permitted when it is one of the following.
- a. A kitchen.
  - b. A laundry or utility room.
  - c. A dressing room.
  - d. A bathroom, WC or shower room.
  - e. Any room on a storey a maximum of 4.5m above ground level, provided with an emergency egress window as described in paragraph 2.10.
  - f. A gallery that complies with paragraph 2.15.
- 2.12** An inner-inner room, or room accessed only via an inner room, is acceptable when all of the following apply.
- a. It complies with paragraph 2.11.
  - b. A maximum of one door separates it from an interlinked smoke alarm.
  - c. None of the access rooms is a kitchen.

## Balconies and flat roofs

**2.13** Where a flat roof forms part of a **means of escape**, it should comply with all of the following.

- It should be part of the same **building** from which escape is being made.
- The route across the roof should lead to a **storey exit** or external **escape route**.
- The part of the roof (including its supporting structure) forming the **escape route**, and any opening within 3m of the **escape route**, should be of **fire resisting** construction (minimum REI 30).

**2.14** A balcony or flat roof intended to form part of an **escape route** should be provided with guarding in accordance with Approved Document K.

## Galleries or mezzanine floors

**2.15** A **gallery** should comply with one of the following.

- It should be provided with an **alternative exit**.
- It should be provided with an emergency egress window, as described in paragraph 2.10, where the **gallery** floor is a maximum of 4.5m above ground level.
- It should meet the conditions shown in diagram 2.6.

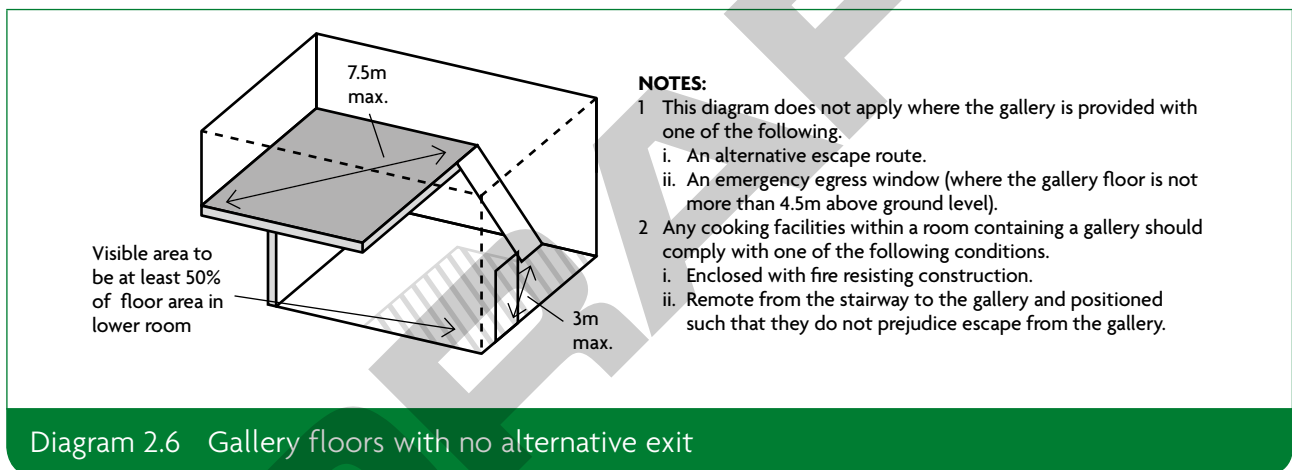


Diagram 2.6 Gallery floors with no alternative exit

## Basements

**2.16** **Basement storeys** containing **habitable rooms** should have one of the following.

- An emergency egress window or external door providing escape from the basement (paragraph 2.10).
- A **protected stairway** (paragraph 2.5a) leading from the basement to a **final exit**.



## External escape stairs

2.17 Any external escape stair should meet all of the following conditions (diagram 2.7).

- a. Access doors to the stair should be **fire resisting** (minimum E 30), except for a single exit door from the **building** to the top landing of a downward-leading external stair.
- b. Flights and landings of an external escape stair should be of **fire resisting** construction (minimum RE 30). **Fire resisting** construction (minimum RE 30) is also required for the **building** envelope within the following zones from the stair.
  - i. 1800mm horizontally.
  - ii. 9m vertically below.
  - iii. 1100mm above the top landing of the stair (except where the stair leads from basement to ground level).
- c. **Fire resisting** construction (minimum RE 30) should protect any part of the **building** or adjoining **building** (including doors) within 1800mm of the escape stair to a place of safety. This does not apply if there is a choice of routes from the foot of the external escape stair.
- d. In areas of **fire resisting** construction, glazing should be fixed shut and **fire resisting** (in terms of integrity, but not insulation).
- e. Stairs more than 6m in **height** should be protected from adverse weather. Protection should prevent the build-up of snow or ice but does not require full enclosure. Some level of protection may be provided by the **building** itself.

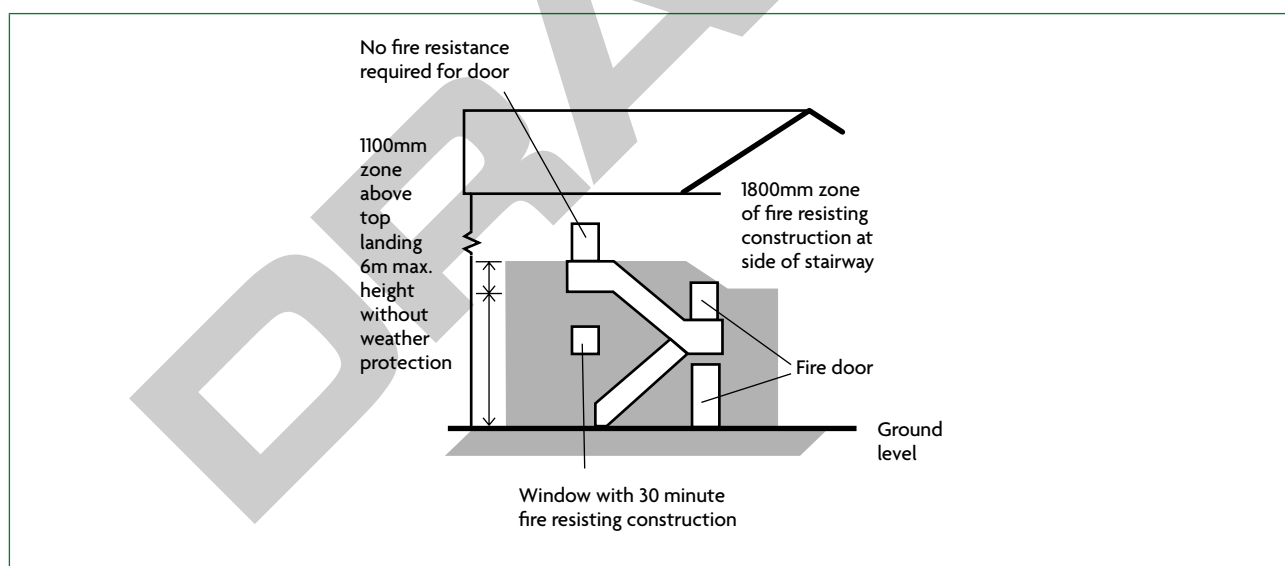


Diagram 2.7 Fire resistance of areas near to external exits

## Work on existing houses

### Replacement windows

- 2.18** Work should comply with Parts K and L of Schedule 1 to the Building Regulations. When complete, the **building** should comply with other applicable parts of Schedule 1 to at least the same level as before.
- 2.19** Where an existing window would be an escape window in a new **dwelling**, and is big enough to be used for escape purposes, then the replacement should comply with one of the following.
- The replacement window should be sized to provide at least the same potential for escape.
  - If the existing window was larger than required for escape purposes, the opening can be reduced to the minimum described in paragraph 2.10.
- 2.20** If windows are replaced, it may be necessary to provide **cavity barriers** around the opening in accordance with section 5.

### Loft conversions

- 2.21** Where a new **storey** is added through conversion, the full extent of the **escape route** should be addressed. Fire resisting doors (minimum E 30 S<sub>a</sub>) and partitions (minimum REI 30) should be provided, including upgrading the existing doors where necessary.
- 2.22** New partitions should be provided to open-plan ground **storey** areas to enclose the **escape route** (diagram 2.2).
- 2.23** Where it is undesirable to replace existing doors because of historical or architectural merit, the possibility of retaining or upgrading them should be investigated.
- 2.24** An alternative approach would be to comply with all of the following.
- Provide sprinkler protection to the open-plan areas.
  - Provide a **fire resisting** partition (minimum REI 30) and door (minimum E 30 S<sub>a</sub>) to separate the ground **storey** from the upper **storeys**. The door should allow occupants of the loft **room** access to a first **storey** escape window.
  - Separate cooking facilities from the open-plan area with **fire resisting** construction.

## Section 3: Means of escape – flats

### Introduction

- 3.1** Separate guidance applies to **means of escape** within the **flat** and within the common parts of the **building** that lead to a place of safety. **Flats** at ground level are treated similarly to houses. With increasing **height**, more complex provisions are needed.
- 3.2** The provisions in this section make the following assumptions.
- Any fire is likely to be in a **flat**.
  - There is no reliance on external rescue.
  - Simultaneous evacuation of all **flats** should not be necessary due to compartmentation.
  - Fires in common parts of the **building** should not spread beyond the fabric in the immediate vicinity. In some cases, however, communal facilities exist that require additional measures to be taken.
- 3.3** Paragraphs 3.4 to 3.20 deal with the **means of escape** within each **flat**. Paragraphs 3.22 to 3.77 deal with the **means of escape** in common areas of the **building** (including mixed use **buildings** in paragraphs 3.67 and 3.68). Guidance for **live/work units** is given in paragraph 3.21.

### General provisions

#### Emergency egress windows and external doors

- 3.4** Windows or external doors providing emergency escape should comply with all of the following.
- Windows should have an unobstructed openable area that complies with all of the following.
    - A minimum area of 0.33m<sup>2</sup>.
    - A minimum height of 450mm and a minimum width of 450mm (may be measured at an angle).
    - The bottom of the openable area is a maximum of 1100mm above the floor.
  - People escaping should be able to reach a place free from danger from fire.
  - Locks (with or without removable keys) and opening stays (with child-resistant release catches) may be fitted to escape windows.
  - Windows should remain open without being held.

#### Inner rooms

- 3.5** An **inner room** is permitted when it is one of the following.
- A kitchen.
  - A laundry or utility room.
  - A dressing room.
  - A bathroom, WC or shower room.

- e. Any **room** on a **storey** a maximum of 4.5m above ground level, provided with an emergency egress window as described in paragraph 3.4.
  - f. A **gallery** that complies with paragraph 3.11.
- 3.6** An inner-inner **room**, or **room** accessed only via an **inner room**, is acceptable when all of the following apply.
- a. It complies with paragraph 3.5.
  - b. A maximum of one door separates it from an interlinked smoke alarm.
  - c. None of the **access rooms** is a kitchen.

## Basements

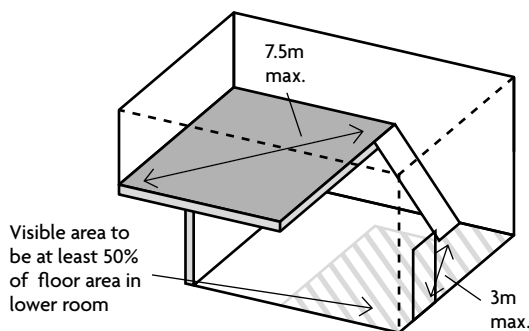
- 3.7** Basement **storeys** containing **habitable rooms** should have one of the following.
- a. An emergency egress window or external door providing escape from the basement (see paragraph 3.4).
  - b. A **protected stairway** (minimum REI 30) leading from the basement to a **final exit**.

## Balconies and flat roofs

- 3.8** Where a flat roof forms part of a **means of escape**, it should comply with all of the following.
- a. It should be part of the same **building** from which escape is being made.
  - b. The route across the roof should lead to a **storey exit** or external **escape route**.
  - c. The part of the roof (including its supporting structure) forming the **escape route**, and any opening within 3m of the **escape route**, should be of **fire resisting** construction (minimum REI 30).
- 3.9** A balcony or flat roof intended to form part of an **escape route** should be provided with guarding etc. in accordance with Approved Document K.
- 3.10** For **flats** more than 4.5m above ground level, a balcony outside an **alternative exit** should be a **common balcony** meeting the conditions described in paragraph 3.19.

## Galleries or mezzanine floors

- 3.11** A **gallery** should comply with one of the following.
- a. It should be provided with an **alternative exit**.
  - b. It should be provided with an emergency egress window, as described in paragraph 3.4, where the **gallery** floor is a maximum of 4.5m above ground level.
  - c. It should meet the conditions shown in diagram 3.1.

**NOTES:**

- 1 This diagram does not apply where the gallery is provided with one of the following.
  - i. An alternative escape route.
  - ii. An emergency egress window (where the gallery floor is not more than 4.5m above ground level).
- 2 Any cooking facilities within a room containing a gallery should comply with one of the following conditions.
  - i. Enclosed with fire resisting construction.
  - ii. Remote from the stairway to the gallery and positioned such that they do not prejudice escape from the gallery.

Diagram 3.1 Gallery floors with no alternative exit

## Flats with upper storeys a maximum of 4.5m above ground level

**3.12** The internal arrangement of single or multi-storey flats should comply with paragraphs 3.13 to 3.15. Alternatively, the guidance in paragraphs 3.16 to 3.19 may be followed.

A flat accessed via the common parts of the building should also comply with the provisions for small single-stair buildings in paragraph 3.25 and diagram 3.9. A protected entrance hall may be required as a result.

### Escape from the ground storey

- 3.13** All habitable rooms (excluding kitchens) should have either of the following.
- a. An opening directly onto a hall leading to a final exit.
  - b. An emergency egress window or door, as described in paragraph 3.4.

### Escape from upper storeys a maximum of 4.5m above ground level

- 3.14** All habitable rooms (excluding kitchens) should have either of the following.
- a. An emergency egress window or external door, as described in paragraph 3.4.
  - b. In multi-storey flats, direct access to a protected internal stair (minimum REI 30) leading to a final exit.
- 3.15** Two rooms may be served by a single escape window. A door between rooms should provide access to the escape window without passing through the stair enclosure. Both rooms should have their own access to the internal stair.

## Flats with storeys more than 4.5m above ground level

### Internal planning of single-storey flats

- 3.16** One of the following approaches should be adopted, observing the **inner room** restrictions described in paragraphs 3.5 and 3.6.
- Provide a **protected entrance hall** (minimum REI 30) serving all **habitable rooms** that meets the conditions shown in diagram 3.2.
  - Plan the **flat** to meet the conditions shown in diagram 3.3, so that both of the following apply.
    - The **travel distance** from the **room's** entrance door to any point in any **habitable room** is a maximum of 9m.
    - Cooking facilities are remote from the main entrance door and do not impede the **escape route** from anywhere in the **flat**.
  - Provide an **alternative exit** from the **flat** complying with paragraph 3.19.

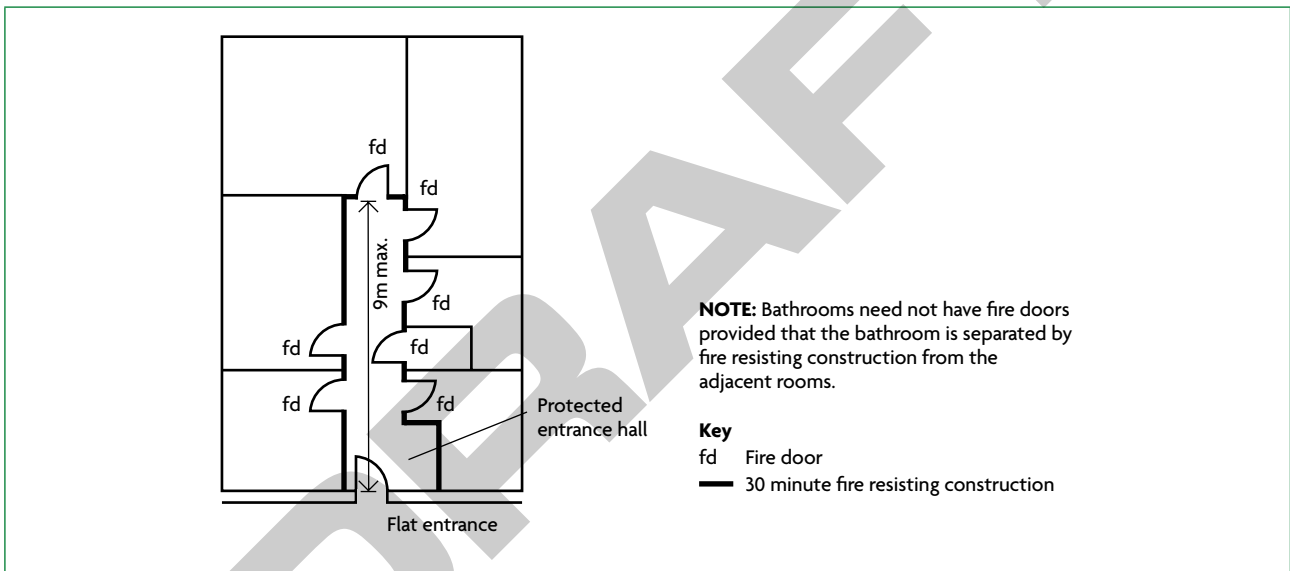


Diagram 3.2 Flat where all habitable rooms have direct access to an entrance hall

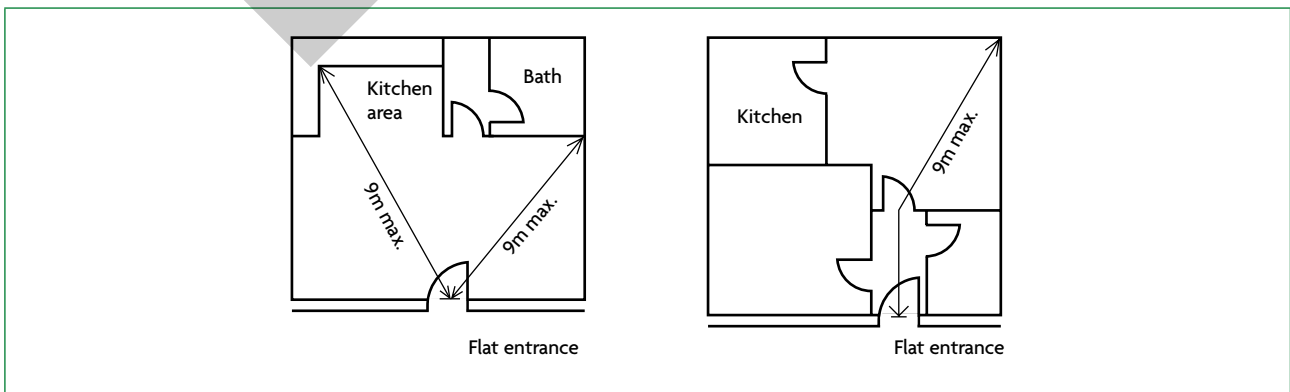


Diagram 3.3 Flat with restricted travel distance from furthest point to entrance

## Flats with an alternative exit

- 3.17** Where access from any **habitable room** to the entrance hall or **flat** entrance is impossible without passing through another **room**, all of the following conditions should be met (diagram 3.4).
- Bedrooms should be separated from living accommodation by **fire resisting** construction (minimum REI 30) and **fire doorsets** (minimum E 30 S<sub>a</sub>).
  - The **alternative exit** should be in the part of the **flat** that contains the bedrooms.

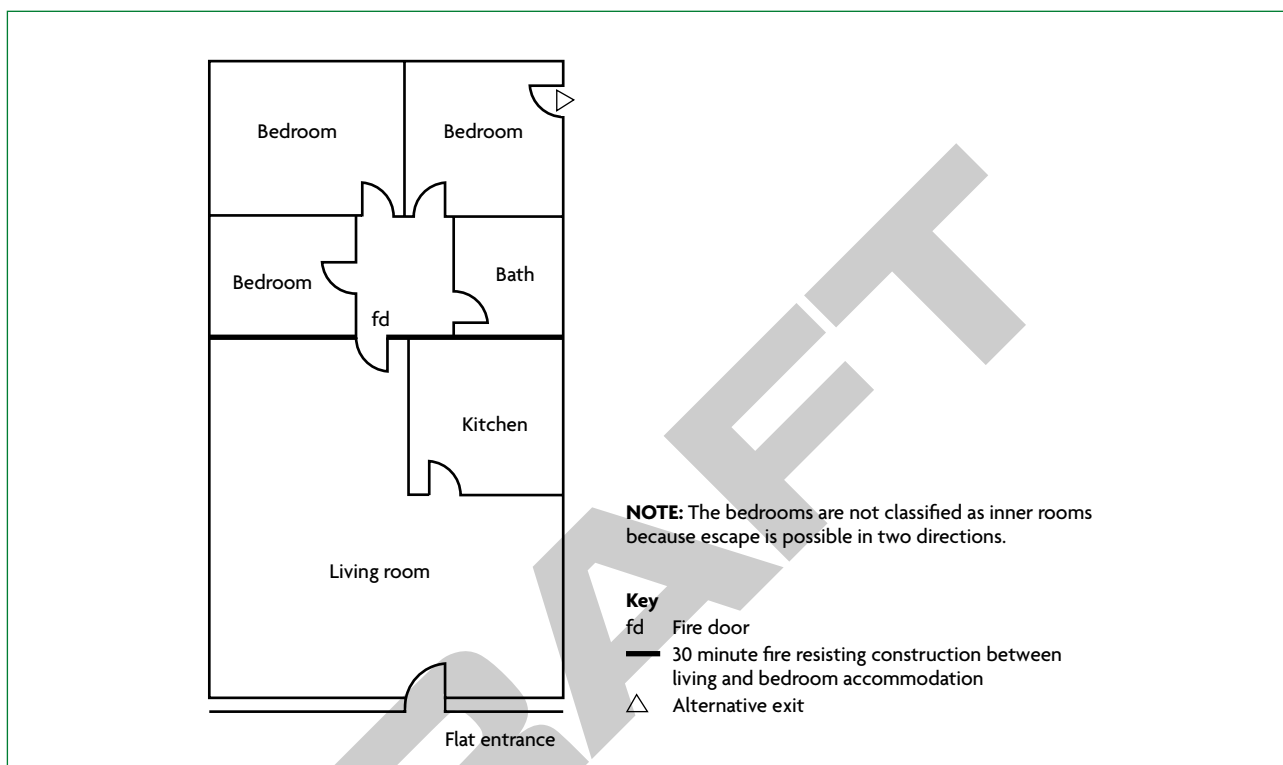


Diagram 3.4 Flat with an alternative exit, but where all habitable rooms have no direct access to an entrance hall

## Internal planning of multi-storey flats

- 3.18** When multi-storey **flats** do not have their own external entrance at ground level, adopt one of the following approaches.
- Approach 1** – provide at least one **alternative exit** from each **habitable room** that is not on the entrance **storey** of the **flat** (diagram 3.5 and paragraph 3.19).
  - Approach 2** – provide at least one **alternative exit** from each **storey** that is not the entrance **storey**. All **habitable rooms** should have direct access to a protected landing (diagram 3.6 and paragraph 3.19).
  - Approach 3** – provide a **protected stairway** plus a sprinkler system in accordance with paragraph 0.13. Provide smoke alarms in accordance with paragraph 1.1.

- d. **Approach 4** – if the vertical distance between the entrance storey and any of the storeys above or below does not exceed 7.5m, provide all of the following.
- A protected stairway.
  - Additional smoke alarms in all habitable rooms.
  - A heat alarm in any kitchen.

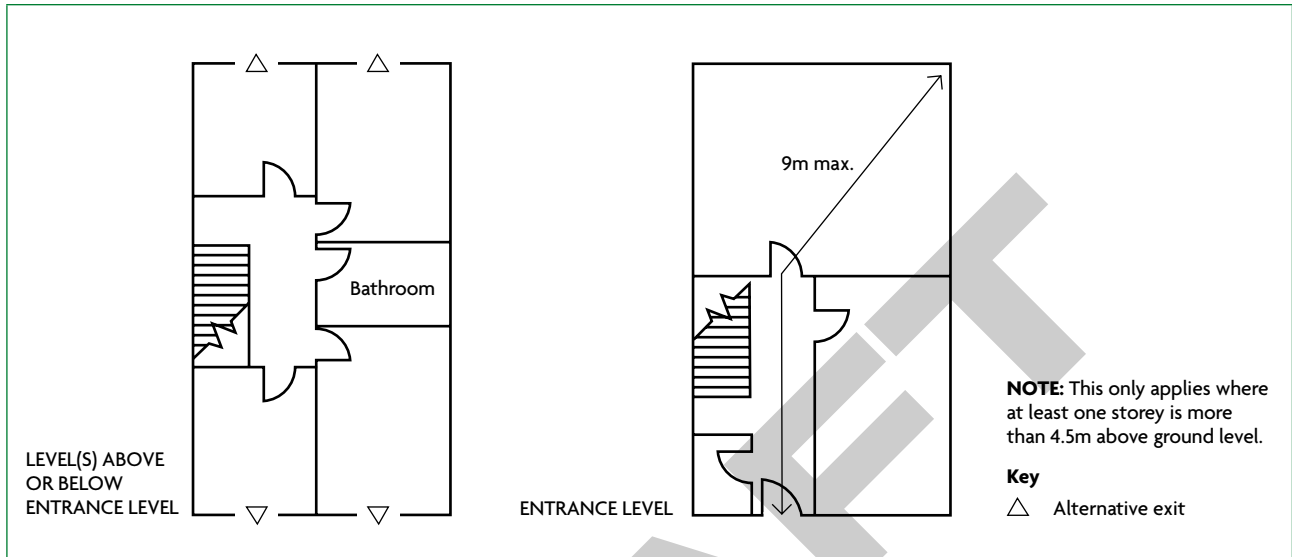


Diagram 3.5 Multi-storey flat with alternative exits from each habitable room, except at entrance level

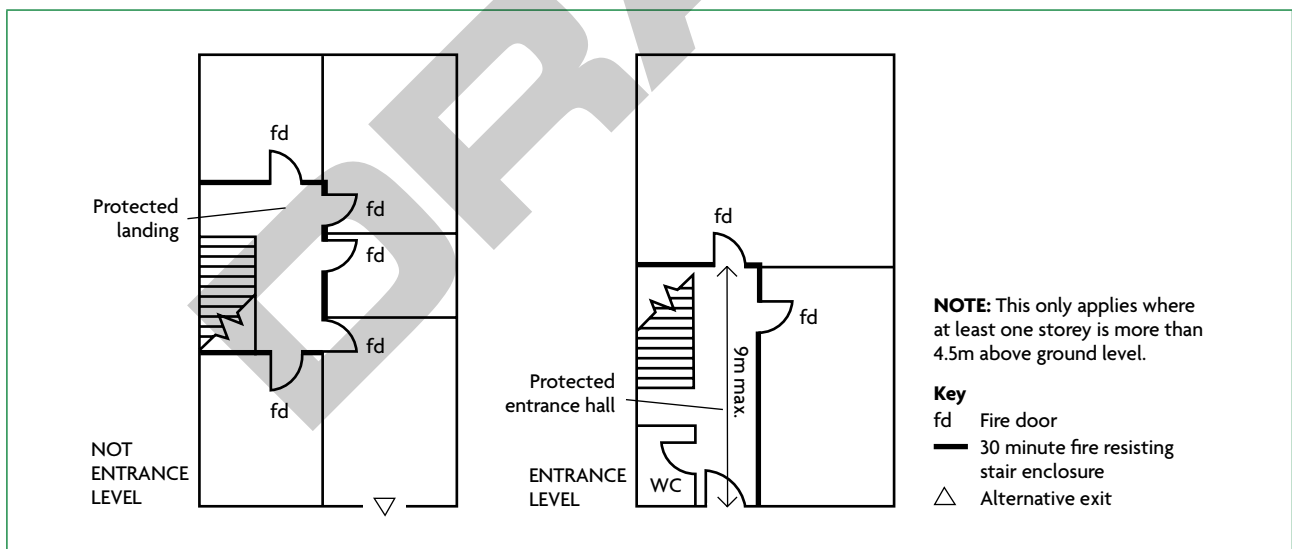


Diagram 3.6 Multi-storey flat with protected entrance hall and landing



## Alternative exits

**3.19** Any **alternative exit** from a **flat** should comply with all of the following.

- a. It should be remote from the main entrance door to the **flat**.
- b. It should lead to a **final exit**, via a **common stair** if necessary, through one of the following.
  - i. A door to an access corridor, access lobby or **common balcony**.
  - ii. An internal private stair leading to an access corridor, access lobby or **common balcony** at another level.
  - iii. A door to a **common stair**.
  - iv. A door to an external stair.
  - v. A door to an **escape route** over a flat roof.

Any access route leading to a **final exit** or **common stair** should comply with paragraph 3.22.

## Air circulation systems in flats with a protected stairway or entrance hall

**3.20** For systems circulating air only within an individual **flat**, take all of the following precautions.

- a. Transfer grilles should not be fitted in any wall, door, floor or **ceiling** of the **protected stairway** or entrance hall enclosure.
- b. Any duct passing through the enclosure should be rigid steel. Joints between the ductwork and enclosure should be fire-stopped.
- c. Ducts serving the enclosure should not serve any other areas.
- d. Mechanical ventilation systems that recirculate air and serve both the enclosure and other areas should shut down upon detecting smoke in the system.
- e. For ducted warm air heating systems, a room thermostat should be sited in the living room. It should be mounted at a height between 1370mm and 1830mm above the floor. The maximum setting should be 27°C.

Ventilation ducts that pass through **compartment walls** should meet the requirements in paragraphs 9.6 to 9.21.

## Live/work units

**3.21** For **flats** serving as a workplace for both occupants and people not living on the premises, provide both of the following.

- a. A maximum **travel distance** of 18m between any part of the working area and either of the following.
  - i. The **flat** entrance door.
  - ii. An alternative **means of escape** that is not a window.

If the **travel distance** is over 18m, the assumptions in paragraph 3.2 may not be valid. The design should be considered on a case-by-case basis.

- b. **Escape lighting** to windowless accommodation in accordance with **BS 5266-1**.

## Means of escape in the common parts of flats

**3.22** The following paragraphs deal with means of escape from the entrance doors of flats to a final exit. They do not apply to flats with a top storey a maximum of 4.5m above ground level (designed in accordance with paragraphs 3.14 and 3.15).

Reference should also be made to the following.

- a. Requirement B3 regarding compartment walls and protected shafts.
- b. Requirement B5 regarding access for the fire and rescue service.

## Number of escape routes

**3.23** A person escaping through the common area, if confronted by the effects of a fire in another flat, should be able to turn away from it and make a safe escape via an alternative route.

**3.24** From the flat entrance door, a single escape route is acceptable in either of the following cases.

- a. The flat is on a storey served by a single common stair and both of the following apply.
  - i. Every flat is separated from the common stair by a protected lobby (minimum REI 30) or common (protected) corridor (see diagram 3.7).
  - ii. The maximum travel distance in table 3.1, for escape in one direction only, is not exceeded.
- b. The flat is in a dead end of a common corridor served by two (or more) common stairs and the maximum travel distance given in table 3.1, for escape in one direction only, is not exceeded (diagram 3.8).

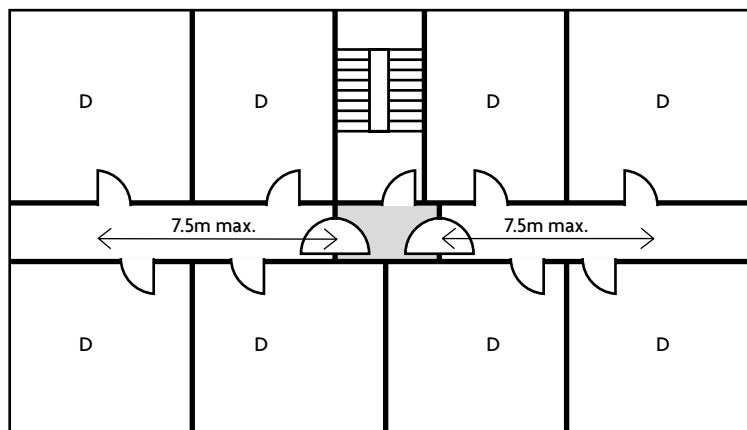
**Table 3.1 Limitations on travel distance in common areas of blocks of flats**

Maximum travel distance from flat entrance door to common stair or stair lobby <sup>(1)</sup>	
Escape in one direction	Escape in more than one direction
7.5m <sup>(2)(3)</sup>	30m <sup>(3)(4)</sup>

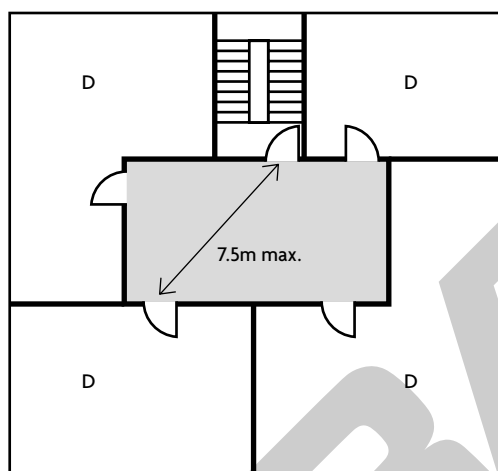
**NOTES:**

1. If travel distance is measured to a stair lobby, the lobby must not provide direct access to any storage room, flat or other space containing a fire hazard.
2. Reduced to 4.5m in a small single-stair building (diagram 3.9).
3. Does not apply if all flats on a storey have independent alternative means of escape.
4. Sheltered housing may require increased provision.

## a. CORRIDOR ACCESS DWELLINGS



## b. LOBBY ACCESS DWELLINGS



### NOTES:

1. The arrangements shown also apply to the top storey.
2. See diagram 3.9 for small single-stair buildings.
3. All doors shown are fire doorsets.
4. Where travel distance is measured to a stair lobby, the lobby must not provide direct access to any storage room, flat or other space containing a potential fire hazard.
5. For further guidance on the fire rating of the fire doorsets from the corridor to the flat and/or stairway please refer to Appendix C, table C1.

### Key

- D Dwelling
- Shaded areas indicate zones where ventilation should be provided in accordance with paragraph 3.43 (An external wall vent or smoke shaft located anywhere in the shaded area)

Diagram 3.7 Flats served by one common stair

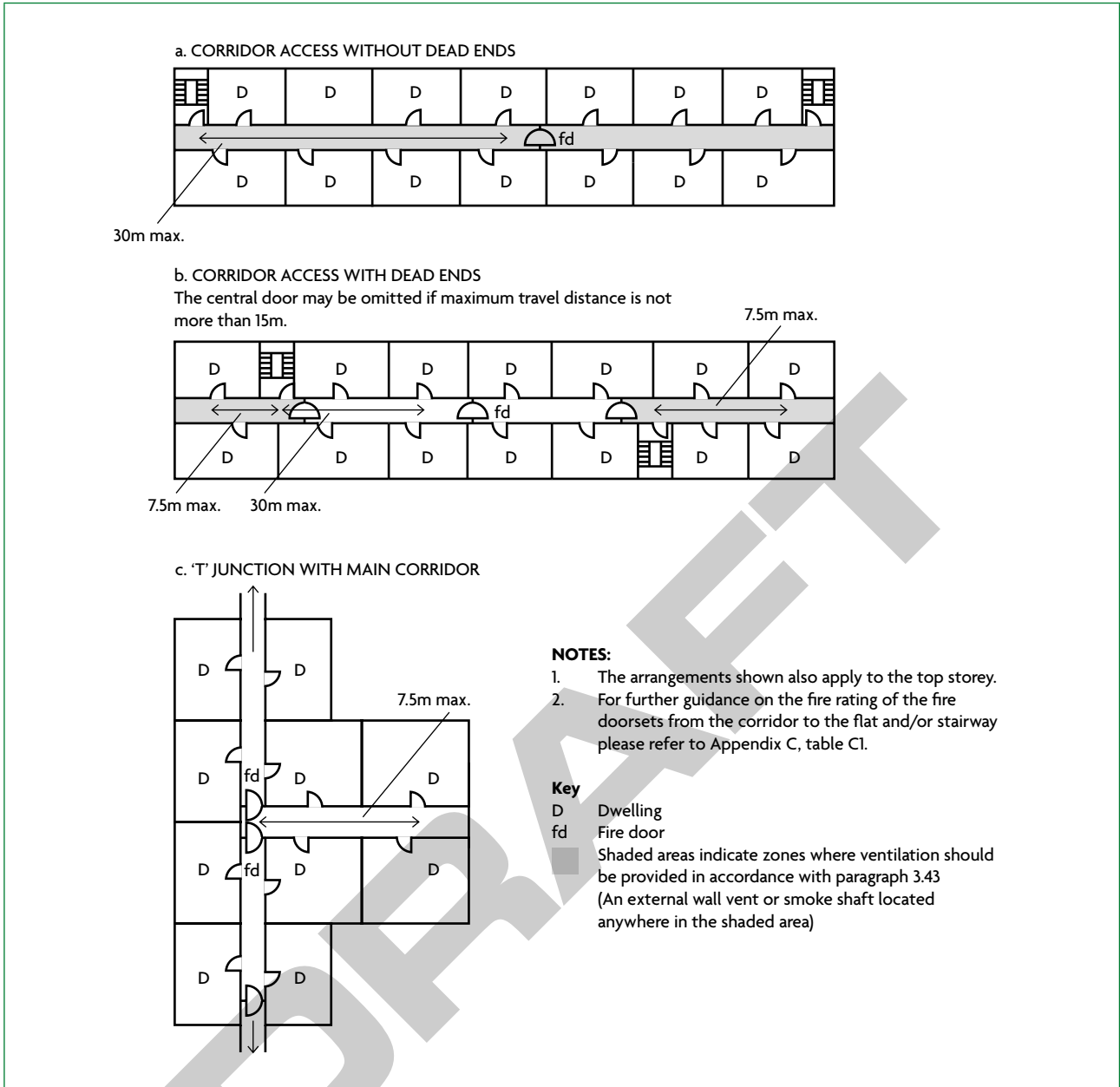


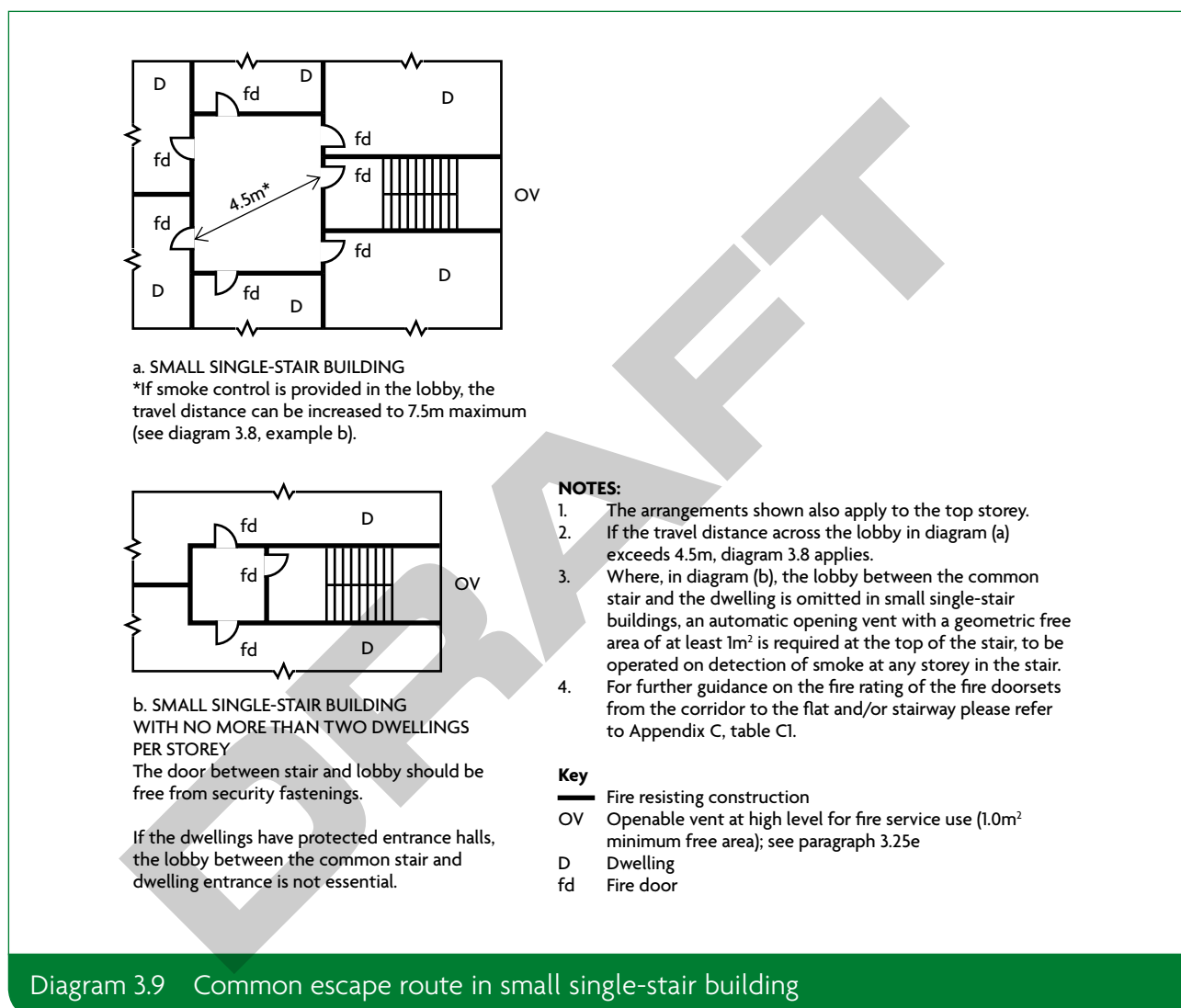
Diagram 3.8 Flats served by more than one common stair

## Small single-stair buildings

**3.25** For some low rise buildings, where external rescue by the fire service is possible, then the use of a single stair may be permitted where all of the following apply.

- a. The top storey of the building is a maximum of 11m above ground level.
- b. No more than three storeys are above the ground storey.
- c. The stair does not connect to a covered car park, unless the car park is open sided (as defined in section 11 of AD B Volume 2).

- d. The stair does not serve offices, stores or other ancillary accommodation. If it does, they should be separated from the stair by a **protected lobby** or **protected corridor** (minimum REI 30) with a minimum 0.4m<sup>2</sup> of permanent ventilation.
- e. Either of the following is provided for the fire and rescue service.
  - i. A high-level openable vent with a geometric free area of at least 1m<sup>2</sup> at each **storey**.
  - ii. A single openable vent with a geometric free area of at least 1m<sup>2</sup> at the head of the stair, operable remotely at the fire and rescue service access level.



## Flats with balcony or deck access

3.26 Paragraph 3.24 may be modified using the guidance in clause 7.3 of **BS 9991:2015**.

## Escape routes over flat roofs

3.27 Where multiple **escape routes** are available from a **storey** or part of a **building**, one may be over a flat roof that meets all of the following.

- a. It should be part of the same **building** from which escape is being made.

- b. The route across the roof should lead to another internal **storey** exit or external **escape route**.
- c. The part of the roof (including its supporting structure) forming the **escape route**, and any opening within 3m of the **escape route**, should be of **fire resisting** construction (minimum REI 30).
- d. The route should be clearly defined and guarded by walls and/or protective barriers to protect against falling.

## Common escape routes

- 3.28** **Escape route travel distances** should comply with table 3.1.
- 3.29** An **escape route** should not pass through one stair enclosure to reach another. It may pass through a protected lobby (minimum REI 30) of one stair to reach another.
- 3.30** Common corridors should be **protected corridors**. The wall between each **flat** and the corridor should be a **compartment wall** (minimum REI 30 where the top **storey** is up to 5m above ground level, otherwise REI 60).
- 3.31** Divide a common corridor connecting two or more **storey exits** with a **fire doorset** fitted with a **self-closing device** (minimum E 30 S<sub>a</sub>). See diagram 3.8. Associated screens should be **fire resisting**. Site doors so that smoke does not affect access to more than one stair.
- 3.32** A **fire doorset** (minimum E 30 S<sub>a</sub>) fitted with a **self-closing device** (and **fire resisting** screen, where required) should separate the **dead-end** portion of a common corridor from the rest of the corridor (diagrams 3.7a, 3.8b and 3.8c).
- 3.33** Ancillary accommodation should not be located in, or entered from, a **protected lobby** or **protected corridor** forming the only common **escape route** on that **storey**.

## Headroom in common escape routes

- 3.34** **Escape routes** should have a minimum clear headroom of 2m. The only projections allowed below this height are door frames.

## Floors of common escape routes

- 3.35** **Escape route** floor finishes should minimise their slipperiness when wet. Finishes include the treads of steps, and surfaces of ramps and landings.

## Lighting of common escape routes

- 3.36** **Escape routes** should have adequate artificial lighting. If the mains electricity power supply fails, **escape lighting** should illuminate the route.
- 3.37** Escape stair lighting should be on a separate circuit from the electricity supply to any other part of the **escape route**.
- 3.38** Standards for a system of **escape lighting** are given in **BS 5266-1**.

## Exit signs on common escape routes

- 3.39** **Escape routes** should be marked by emergency exit signs of adequate size that comply with the Health and Safety (Safety Signs and Signals) Regulations 1996.

Signs containing symbols or pictograms that conform to **BS 5499-1** satisfy these regulations. Some buildings may require additional signs to meet other legislation.

Advice on fire safety signs, including emergency escape signs, is given in the HSE publication *Safety signs and signals: Guidance on Regulations*.

## Protected power circuits

- 3.40** To limit potential damage to cables in protected circuits, all of the following should apply.
- Cables should be sufficiently robust.
  - Cable routes should be carefully selected and/or physically protected in areas where cables may be exposed to damage.
  - Methods of cable support should be class A1 rated and offer at least the same integrity as the cable.
- 3.41** A protected circuit to operate equipment during a fire should achieve all of the following.
- Cables should achieve PH 30 classification when tested in accordance with **BS EN 50200** (incorporating Annex E), or an equivalent standard.
  - It should only pass through parts of the building in which the fire risk is negligible.
  - It should be separate from any circuit provided for another purpose.
- 3.42** Guidance on cables for large and complex buildings is given in **BS 5839-1**, **BS 5266-1** and **BS 7346-6**.

## Smoke control of common escape routes

- 3.43** Ventilation of common areas should be provided to reduce/control smoke and maintain the integrity of the escape route. Ventilation can be natural (paragraphs 3.44 to 3.47) or mechanical (paragraph 3.48).

### Smoke control of common escape routes by natural smoke ventilation

- 3.44** Except in buildings that comply with diagram 3.9, the corridor or lobby next to each stair should have a smoke vent. The location of the vent should comply with both of the following.
- As high as practicable.
  - Positioned so the top edge is at least as high as the top of the door to the stair.
- 3.45** A vent to the outside with a free area of a minimum of 1m<sup>2</sup> should be provided from the top storey of the stair.
- 3.46** In single-stair buildings, smoke vents on the storey where the fire is initiated, and the vent at the head of the stair, should be activated by smoke detectors in the common parts.
- In buildings with more than one stair, smoke vents may be activated manually. The control system should open the vent at the head of the stair before, or at the same time as, the vent on the storey where the fire is located. Smoke detection is not required for ventilation purposes in this instance.
- 3.47** Smoke vents should comply with one of the following.
- They should be located on an external wall with minimum free area of 1.5m<sup>2</sup>.

- b. They should discharge into a vertical smoke shaft, closed at the base, meeting all of the following criteria.
- i. The shaft should meet with the following conditions.
    - Have a minimum cross-sectional area of 1.5m<sup>2</sup> (minimum dimension 0.85m in any direction).
    - Open at roof level, minimum 0.5m above any surrounding structures within 2m of it horizontally.
    - Extend a minimum of 2.5m above the ceiling of the highest storey served by the shaft.
  - ii. The free area of all the following vents should be a minimum of 1m<sup>2</sup>.
    - From the corridor or lobby into the shaft.
    - At the opening at the head of the shaft.
    - At all internal locations within the shaft (e.g. safety grilles).
  - iii. The smoke shaft should be constructed from a class A1 material. All vents should have a fire/smoke resistance to match at least that of an E 30 S<sub>a</sub> fire doorset. The shaft should be vertical from base to head, with a maximum of 4m at a maximum inclined angle of 30 degrees.
  - iv. If smoke is detected in the common corridor or lobby, both of the following should occur.
    - Simultaneous opening of vents on the storey where the fire is located, at the top of the smoke shaft and to the stairway.
    - Vents from the corridors or lobbies on all other storeys should remain closed, even if smoke is subsequently detected on storeys other than where the fire is located.

### Smoke control of common escape routes by mechanical ventilation

**3.48** Guidance on the design of smoke control systems that use pressure differentials is available in **BS EN 12101-6**.

### Refuse chutes and storage

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

**3.50** Refuse chutes and rooms for storing refuse should meet both of the following conditions.

- a. Be separated from other parts of the building by fire resisting construction (minimum REI 30 in buildings with a top storey up to 5m above ground level; otherwise REI 60).
- b. Not be situated within a protected stairway or protected lobby.

**3.51** The approach to rooms containing refuse chutes or for storing refuse should comply with one of the following conditions.

- a. Be directly from the open air.
- b. Be through a protected lobby with a minimum 0.2m<sup>2</sup> of permanent ventilation.

**3.52** Access openings to refuse storage chambers should *not* be sited in the following areas.

- a. Next to escape routes or final exits.
- b. Near the windows of flats.



## Common stairs

### Number of common stairs

**3.53** A building should provide access to more than one common stair if it does not meet the criteria for a single common stair (see paragraph 3.25).

### Width of common stairs

**3.54** A stair of acceptable width for everyday use will be sufficient for escape purposes. If it is also a firefighting stair, it should be at least 1100mm wide. The width is the clear width between the walls or balustrades, and any handrails and strings intruding into that width by a maximum of 100mm may be ignored.

### Protection of common stairs

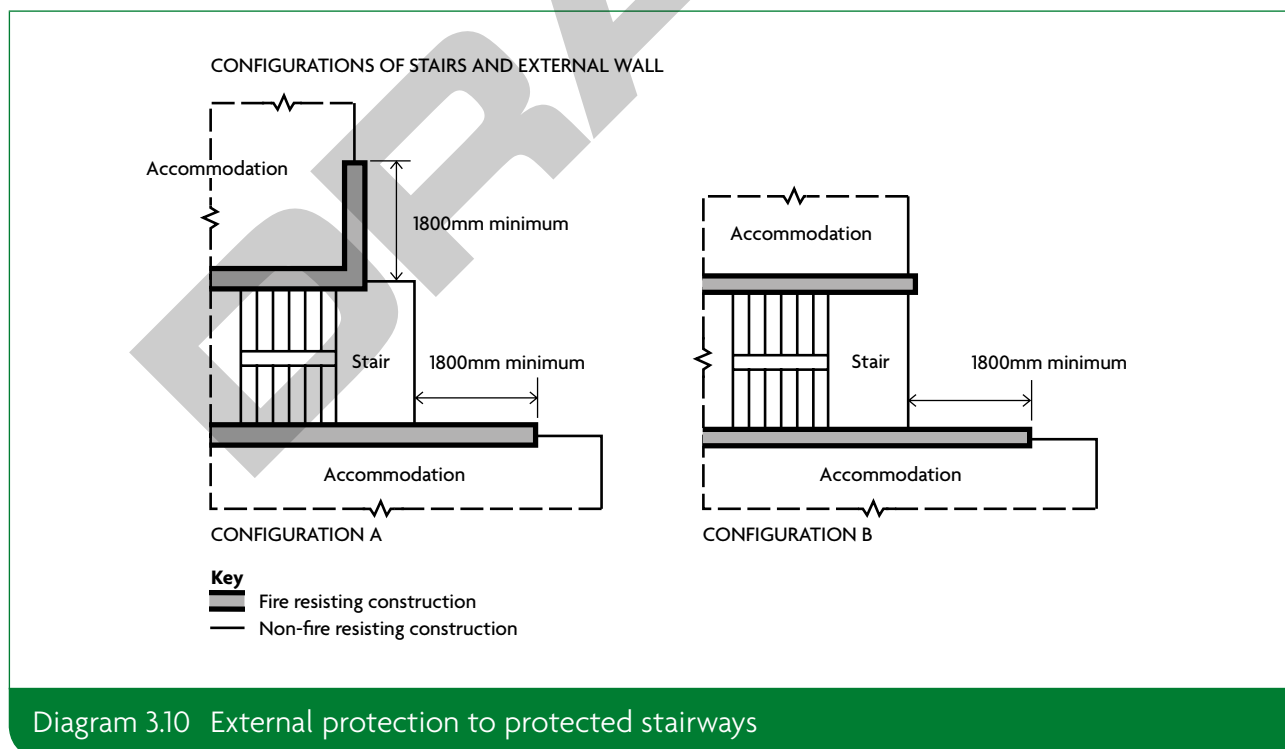
**3.55** Section 7 provides guidance on avoiding the spread of fire between storeys. For a stair that is also a firefighting stair, guidance in section 15 should be followed.

### Enclosure of common stairs

**3.56** Every common stair should be a protected stairway, within a fire resisting enclosure (minimum REI 30).

### External walls adjacent to protected stairways

**3.57** As shown in diagram 3.10, the minimum distance between an unprotected area of the building enclosure and an unprotected area of the stair enclosure should be 1800mm.



## External escape stairs

**3.58** External stairs should not serve storeys more than 6m above ground level.

**3.59** Any external escape stair should meet all of the following requirements (diagram 3.11).

- a. Access doors to the stair should be fire resisting (minimum E 30) and be fitted with a self-closing device, except for a single exit door from the building to the top landing of a downward-leading external stair.
- b. Flights and landings of an external escape stair should be of fire resisting construction (minimum RE 30). Fire resisting construction is also required for the building envelope within the following zones from the stair.
  - i. 1800mm above and horizontally.
  - ii. 9m vertically below.
  - iii. 1100mm above the top landing of the stair (except where the stair leads from basement to ground level).
- c. Fire resisting construction (minimum RE 30) should protect any part of the building or adjoining building (including doors) within 1800mm of the escape stair to a place of safety. This does not apply if there is a choice of escape routes from the foot of the external escape stair.
- d. In areas of fire resisting construction, glazing should be fixed shut and fire resisting (in terms of integrity but not insulation).

**3.60** Access to an external escape stair may be via a flat roof, provided the flat roof meets the requirements of paragraph 3.27.

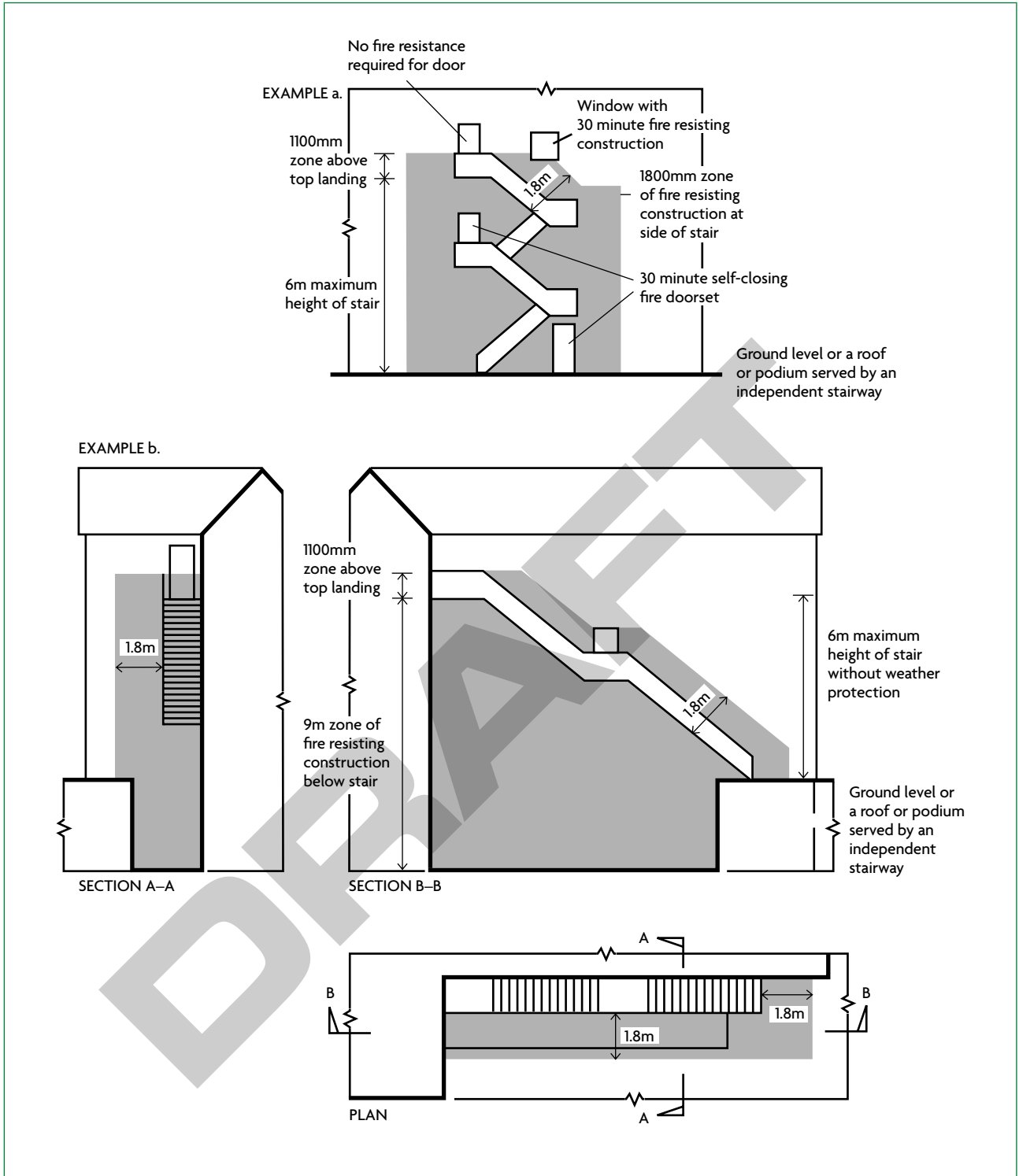


Diagram 3.11 Fire resistance of areas near to external stairs

## Separation of adjoining protected stairways

**3.61** Two adjacent **protected stairways** (or **exit passageways** leading to different **final exits**) should be separated by an imperforate enclosure.

## Basement stairs

**3.62** If a **building** does not meet the criteria of paragraph 3.25, an escape stair forming part of the only **escape route** from an upper **storey** should *not* continue down to serve a basement. The basement should be served by a separate escape stair.

**3.63** Where multiple escape stairs serve the upper **storeys**, only one needs to end at ground level. If a **protected lobby** or **protected corridor** connects the stairs and accommodation at each basement level, other stairs may connect with the basements.

## Stairs serving ancillary accommodation

**3.64** Except in **buildings** described in paragraph 3.25, **common stairs** forming part of the only **escape route** from a **flat** should not serve any of the following.

- a. Covered car park.
- b. Boiler room.
- c. Fuel storage space.
- d. Other ancillary accommodation.

**3.65** Where a **common stair** is not part of the only **escape route** from a **flat**, it may also serve ancillary accommodation from which it is separated by a **protected lobby** or **protected corridor** (minimum REI 30).

**3.66** Where a stair serves an enclosed car park or **place of special fire hazard**, the lobby or corridor should have a minimum 0.4m<sup>2</sup> permanent ventilation.

## Flats in mixed use buildings

**3.67** In **buildings** with a maximum of three **storeys** above the ground **storey**, stairs may serve both flats and other occupancies, provided that the stairs are separated from each occupancy by protected lobbies (minimum REI 30) at each **storey**.

**3.68** In **buildings** with more than three **storeys** above the ground **storey**, stairs may serve the **flats** and other occupancies if all of the following apply.

- a. The **flat** is ancillary to the main use of the **building**.
- b. The **flat** has an independent **alternative escape route**.
- c. The stair is separated from occupancies on lower **storeys** by a **protected lobby** (minimum REI 30) at each of those **storeys**.
- d. The stair enclosure has at least the same standard of fire resistance as for the structural elements of the **building** (minimum REI 60); if the stair is a **firefighting stair**, it should accord with the provisions in section 15.
- e. Any automatic fire detection and alarm system fitted in the main part of the **building** also covers all **flats**.
- f. Any security measures in any parts of the **building** do not prevent escape at all times.

## Use of space within protected stairways

**3.69** A protected stairway should not be used for anything else, except a lift well or electricity meters.

### Electricity meter(s) in protected stairways

**3.70** In single-stair buildings, electricity meters should be in securely locked cupboards. Cupboards should be separated from the escape route with fire resisting construction.

### Gas service and installation pipes in protected stairways

**3.71** Gas service and installation pipes and meters should not be within a protected stairway, unless installed in accordance with the Pipelines Safety Regulations 1996 and the Gas Safety (Installation and Use) Regulations 1998.

## Exits from protected stairways

**3.72** Every protected stairway should lead to a final exit, either directly or via a protected exit passageway. Any protected exit corridor or stair should have the same standard of fire resistance and lobby protection as the stair it serves.

### Construction of escape stairs

**3.73** In all of the following situations, the flights and landings of escape stairs should be constructed of materials achieving class A2-s3, d2 or better.

- a. If it is the only stair in a building with more than three storeys.
- b. If the escape stair is within a basement.
- c. If the escape stair serves any storey more than 18m above ground or the access level.
- d. If it is an external escape stair, except where the stair connects the ground storey or paving level with a floor or flat roof a maximum of 6m above or below ground level.
- e. If it is a firefighting stair.

Combustible materials may be added to the top horizontal surface, except on firefighting stairs.

**3.74** Further guidance on the construction of firefighting stairs is given in section 15. Dimensional constraints on the design of stairs are given in Approved Document K.

### Single steps

**3.75** Single steps on escape routes should be prominently marked. A single step on the line of a doorway is acceptable, subject to paragraph 3.98.

### Fixed ladders

**3.76** Fixed ladders should not be provided as a means of escape for members of the public. They should only be provided where a conventional stair is impractical, such as for access to plant rooms not normally occupied.

## Fire doorsets on escape routes

3.77 Fire resistance test criteria and standards of performance are set out in Appendix C.

### Fire resistance of glazed elements

3.78 If glazed elements in **fire resisting** enclosures and doors are only able to satisfy the relevant performance in terms of integrity, the area of glass that can be used is limited. These limitations depend on whether the enclosure forms part of a **protected shaft** (see section 7) and the provisions set out in Appendix B, table B4.

3.79 If both integrity and insulation requirements can be met, this document does not restrict the use or amount of glass.

### Doors on escape routes

3.80 Doors on **escape routes** (both within and from the **building**) should comply with paragraphs 3.81 to 3.88. Doors should be readily opened to avoid undue delay to people escaping.

#### Door fastenings

3.81 All doors on **escape routes** should be either of the following.

- a. Not fitted with locks, latches or bolts.
- b. Fitted only with simple fastenings that are all of the following.
  - i. Easy to operate; it should be apparent how to undo the fastening.
  - ii. Operable from the side approached by people escaping.
  - iii. Operable without a key.
  - iv. Operable without requiring people to manipulate more than one mechanism.

Doors may be fitted with hardware to allow them to be locked when **rooms** are empty.

3.82 If a door on an **escape route** has to be locked when the **building** is occupied, it should only be fitted with a lock or fastening that meets all of the following conditions.

- a. Is easy to operate.
- b. Is operated without a key.
- c. Is operated from the side approached by people escaping.

If a secure door is operated by code or combination keypad, swipe or proximity card, biometric data, etc., a security mechanism override should be possible from the side approached by people escaping.

3.83 Electrically powered locks should return to the unlocked position in all of the following situations.

- a. If the **fire alarm system** operates.
- b. If there is loss of power or system error.
- c. If a Type A manual door release unit to **BS EN 54-11** positioned on the side approached by people escaping is activated. If the door provides escape in either direction, a unit should be installed on both sides of the door.

**3.84** Guidance on door closing and 'hold open' devices for **fire doorsets** is set out in Appendix C.

### Direction of opening

**3.85** The door of any doorway or exit should be hung to open in the direction of escape wherever possible. It should always be hung to open in the direction of escape if more than 60 people might be expected to use it during a fire.

### Amount of opening and effect on associated escape routes

**3.86** All doors on **escape routes** should be hung to meet both of the following conditions.

- a. Open by a minimum of 90 degrees.
- b. Open with a swing that complies with both of the following.
  - i. Is clear of any change of floor level, other than a threshold or single step on the line of the doorway.
  - ii. Does not reduce the effective width of any **escape route** across a landing.

**3.87** Any door opening towards a corridor or a stair should be recessed to prevent its swing encroaching on the effective width.

### Revolving and automatic doors

**3.88** Where revolving doors, automatic doors and turnstiles are placed across **escape routes** they should comply with one of the following.

- a. They are automatic doors of the required width and comply with the following conditions.
  - i. Their failsafe system provides outward opening from any open position.
  - ii. They have a monitored failsafe system to open the doors if the mains electricity supply fails.
  - iii. They failsafe to the open position if the power fails.
- b. Non-automatic swing doors of the required width are provided immediately adjacent to the revolving or automatic door or turnstile.

## Lifts

### Fire protection of lift installations

**3.89** Lift wells should comply with one of the following conditions.

- a. Be sited within the enclosures of a **protected stairway**.
- b. Be enclosed with **fire resisting** construction (minimum REI 30) when in a position that might prejudice the **means of escape**.

**3.90** A lift well connecting different **compartments** should form a **protected shaft** (see section 7).

**3.91** In **buildings** designed for phased horizontal evacuation, if the lift well is not within the enclosures of a **protected stairway**, its entrance should be separated at every **storey** by a protected lobby (minimum REI 30).

**3.92** In basements and enclosed car parks, the lift should be within the enclosure of a **protected stairway**. Otherwise, the lift should be approached only via a **protected lobby** or **protected corridor** (minimum REI 30).

- 3.93** The lift should be approached via a **protected lobby** or **protected corridor** (minimum REI 30) where both of the following apply.
- Where the lift serves any **storey** containing high fire risk areas (kitchens, communal lounges, stores).
  - Where the lift delivers directly into corridors serving sleeping accommodation.
- 3.94** A lift shaft should not serve any basement where either of the following applies.
- There is only one escape stair and smoke from a basement fire would adversely affect **escape routes** in the upper **storeys**.
  - The lift shaft is within the enclosure to an escape stair that terminates at ground level.
- 3.95** Lift machine rooms should be sited over the lift well where practical. Where **buildings** with one stair make this arrangement impractical, the lift should be sited outside the **protected stairway**.

## Final exits

- 3.96** The width of a **final exit** should be at least the same as the minimum width of the **escape route** it serves.
- 3.97** People should be able to rapidly leave the area around the **building**. Direct access to a street, passageway, walkway or open space should be available. The route away from the **building** should comply with the following.
- Be well defined.
  - If necessary, have suitable guarding.
- 3.98** **Final exits** should not present a barrier for disabled people. Where the route to a **final exit** does not include stairs, a level threshold and, where necessary, a ramp should be provided.
- 3.99** **Final exit** locations should be clearly visible and recognisable.
- 3.100** **Final exits** should avoid outlets of basement smoke vents and openings to transformer chambers, refuse chambers, boiler rooms and similar risks.



## Requirement B2: Internal fire spread (linings)

This section deals with the following requirement from Part B of Schedule 1 to the Building Regulations 2010.

Requirement	
<p><i>Requirement</i></p> <p><b>Internal fire spread (linings)</b></p> <p><b>B2.</b> (1) To inhibit the spread of fire within the building, the internal linings shall:</p> <ul style="list-style-type: none"> <li>(a) adequately resist the spread of flame over their surfaces; and</li> <li>(b) have, if ignited, either a rate of heat release or a rate of fire growth, which is reasonable in the circumstances.</li> </ul> <p>(2) In this paragraph 'internal linings' means the materials or products used in lining any partition, wall, ceiling or other internal structure.</p>	<p><i>Limits on application</i></p>

### Intention

In the Secretary of State's view, requirement B2 is met by achieving a restricted spread of flame over internal linings. The building fabric should make a limited contribution to fire growth, including a low rate of heat release.

Requirement B2 *does not* include guidance on the following.

- a. Generation of smoke and fumes.
- b. The upper surfaces of floors and stairs.
- c. Furniture and fittings.

## Section 4: Wall and ceiling linings

### Classification of linings

4.1 The surface linings of walls and ceilings should meet the classifications in table 4.1.

**Table 4.1 Classification of linings**

Location	Classification
Small rooms of maximum area of 4m <sup>2</sup>	D-s3, d2
Domestic garages of maximum area of 40m <sup>2</sup>	
Other rooms (including garages)	C-s3, d2
Circulation spaces within dwellings	
Other circulation spaces (including the common areas of blocks of flats)	B-s3, d2 <sup>(1)</sup>

**NOTE:**

1. Wallcoverings which conform to **BS EN 15102**, achieving at least class C-s3, d2 and bonded to a class A2-s3, d2 substrate, will also be applicable.

### Walls

4.2 For the purposes of this requirement, a wall includes both of the following.

- a. The surface of internal and external glazing (except glazing in doors).
- b. Any part of a ceiling which slopes at an angle greater than 70 degrees from the horizontal.

4.3 For the purposes of this requirement, a wall *does not* include any of the following.

- a. Doors and door frames.
- b. Window frames and frames in which glazing is fitted.
- c. Architraves, cover moulds, picture rails, skirtings and similar narrow members.
- d. Fireplace surrounds, mantle shelves and fitted furniture.

4.4 Parts of walls in rooms may be of lower performance than stated in table 4.1, but not lower than class D-s3, d2. In any one room, the total area of lower performance should be less than half of the room's floor area, up to a maximum of 20m<sup>2</sup>.

### Ceilings

4.5 For the purposes of this requirement, a ceiling includes all of the following.

- a. Glazed surfaces.
- b. Any part of a wall at 70 degrees or less to the horizontal.
- c. The underside of a gallery.
- d. The underside of a roof exposed to the room below.

- 4.6 For the purposes of this requirement, a **ceiling** *does not* include any of the following.
- Trap doors and their frames.
  - The frames of windows or **rooflights** and frames in which glazing is fitted.
  - Architraves, cover moulds, picture rails, exposed beams and similar narrow members.

### Fire-protecting suspended ceilings

- 4.7 When determining the overall fire resistance of a floor and/or **ceiling** assembly, any **suspended ceiling** should meet the classifications in paragraph 4.1.

### Fire resisting ceilings

- 4.8 The need for **cavity barriers** in concealed floor or roof spaces can be reduced by installing a **fire resisting ceiling** (minimum EI 30) below the cavity.

### Rooflights

- 4.9 **Rooflights** should meet the following classifications, according to material. No guidance for European fire test performance is currently available, because there is no generally accepted test and classification procedure.
- Non-plastic **rooflights** should meet the relevant classification in table 4.1.
  - Plastic **rooflights**, if the limitations in table 4.2 and table 12.2 are observed, should be a minimum class 3 rating. Otherwise they should meet the relevant classification in table 4.1.

### Special applications

- 4.10 Any flexible membrane covering a structure, other than an air-supported structure, should comply with Appendix A of **BS 7157**.
- 4.11 Guidance on the use of PTFE-based materials for tension-membrane roofs and structures is given in the BRE report BR 274.

### Fire behaviour of insulating core panels used for internal structures

- 4.12 Insulating core panels consist of an inner core of insulation sandwiched between, and bonded to, a membrane, such as galvanised steel or aluminium. When exposed to a fire, the bond can fail, causing the panel to lose its stiffness and exposing the insulation to the fire.

Insulating core panel systems are used for external cladding as well as for internal structures. Where they are used for external cladding, they should be used in accordance with the guidance on **external wall** construction in section 11.

Where they are used for internal structures they can present particular problems with regard to fire spread, and should meet all of the following.

- Panels with a core which is not class A1 should be sealed to prevent exposure of the core to a fire. This includes at joints and where services penetrate the panel.
- In high fire risk areas, such as kitchens, **places of special fire hazard**, or in proximity to where hot works occur, only class A1 cored panels should be used.
- Fixing systems for all panels should be designed to take account of the potential for the panel to delaminate. For instance, where panels are used to form a **suspended ceiling**, the fixing should pass through the panel and support it from the lower face.

Further advice can be found in *Design, construction, specification and fire management of insulated envelopes for temperature controlled environments* published by the International Association of Cold Storage Contractors (European Division).

## Other controls on internal surface properties

4.13 Guidance on enclosures to above-ground drainage system pipes is given in section 9.

## Thermoplastic materials

### General

4.14 Thermoplastic materials that do not meet the performance requirements in table 4.1 can be used as described in paragraphs 4.15 to 4.20. No guidance for European fire test performance is currently available, because there is no generally accepted test and classification procedure.

Thermoplastic materials are defined, and the classifications used here explained, in Appendix B.

### Windows

4.15 Thermoplastic material classified as a TP(a) rigid product may be used to glaze external windows to rooms, but not external windows to circulation spaces. Approved Document K includes guidance on the safety of glazing.

### Rooflights

4.16 In rooms and circulation spaces other than protected stairways, rooflights may be constructed of thermoplastic material if they comply with both of the following.

- The lower surface is classified as TP(a) rigid or TP(b).
- The size and location of the rooflights follow the limits in table 4.2 and table 12.3.

### Lighting diffusers

4.17 The following paragraphs apply to lighting diffusers forming part of a ceiling. Diffusers may be part of a luminaire, or used below sources of light.

The following paragraphs do not apply to diffusers of light fittings attached to the soffit of a ceiling or suspended beneath a ceiling (diagram 4.1).

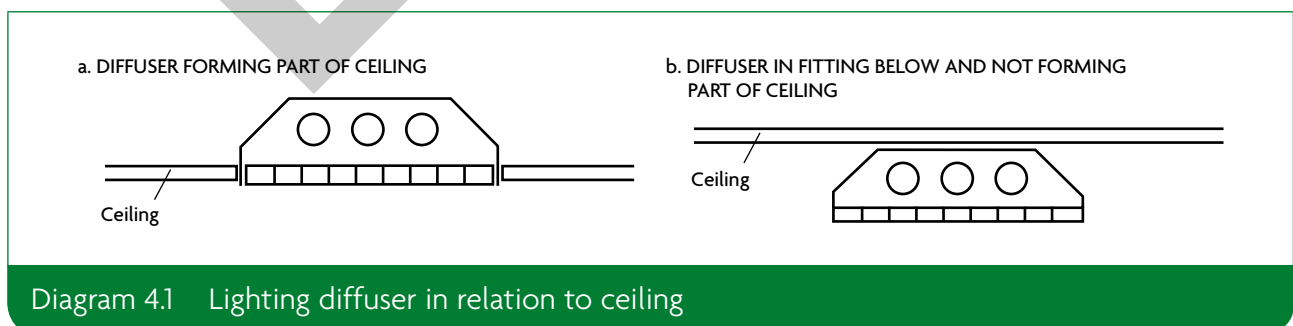


Diagram 4.1 Lighting diffuser in relation to ceiling

4.18 To be used in fire-protecting or fire resisting ceilings, thermoplastic lighting diffusers should be part of a tested ceiling system.

- 4.19** Ceilings to rooms and circulation spaces, but not to protected stairways, may incorporate diffusers constructed of thermoplastic material if both of the following conditions are met.
- Except for the upper surfaces of the thermoplastic panels, wall and ceiling surfaces exposed in the space above the suspended ceiling should comply with paragraph 4.1.
  - Diffusers should be classified as one of the following.
    - TP(a) rigid – no restrictions on their extent.
    - TP(b) – limited in their extent (see table 4.2 and diagram 4.2).

## Suspended or stretched-skin ceilings

**4.20** Where not required to be fire resisting, the ceiling may be constructed from TP(a) flexible panels. Each panel should meet the following conditions.

- Have a maximum area of 5m<sup>2</sup>.
- Be supported on all sides.

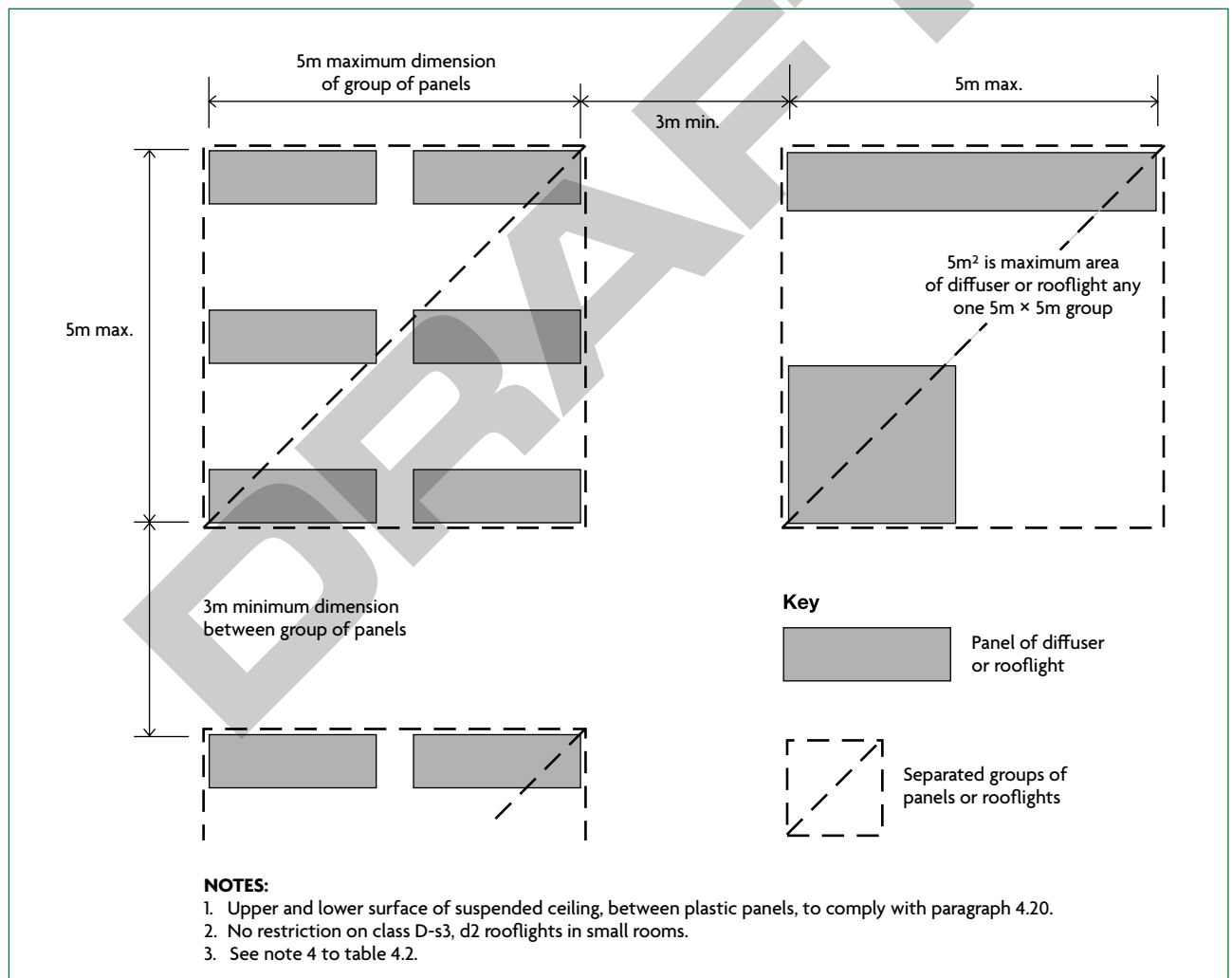


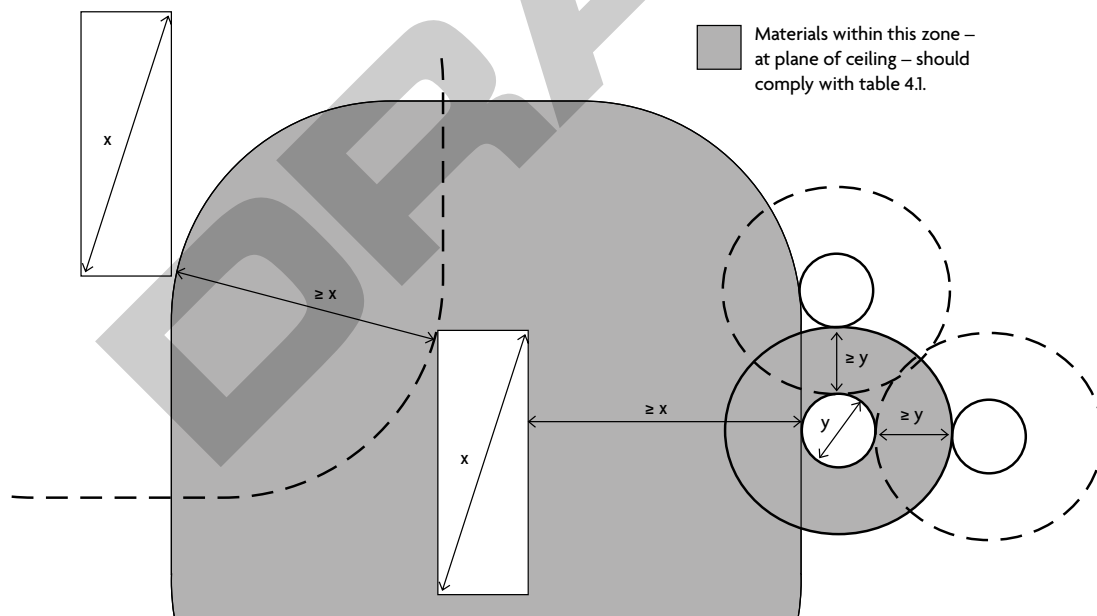
Diagram 4.2 Layout restrictions on class D-s3, d2 plastic rooflights, TP(b) rooflights and TP(b) lighting diffusers

**Table 4.2 Limitations applied to thermoplastic rooflights and lighting diffusers in suspended ceilings and class D-s3, d2 plastic rooflights**

Minimum classification of lower surface	Use of space below the diffusers or rooflights	Maximum area of each diffuser panel or rooflight <sup>(1)</sup>  (m <sup>2</sup> )	Maximum total area of diffuser panels and rooflights as a percentage of floor area of the space in which the ceiling is located (%)	Minimum separation distance between diffuser panels or rooflights <sup>(1)</sup>  (m)
TP(a)	Any except protected stairways	No limit <sup>(2)</sup>	No limit	No limit
Class D-s3, d2 <sup>(3)</sup> or TP(b)	Rooms	5	50 <sup>(4)</sup>	3
	Circulation spaces except protected stairways	5	15 <sup>(4)</sup>	3

**NOTES:**

1. Smaller panels can be grouped together if the overall size of the group and the space between one group and any others satisfies the dimensions shown in diagram 4.2 or 4.3.
2. Lighting diffusers of TP(a) flexible rating should be used only in panels of a maximum of 5m<sup>2</sup> each, see paragraph 4.20.
3. There are no limits on the use of class D-s3, d2 materials in small rooms; see table 4.1.
4. The minimum 3m separation given in diagram 4.2 between each 5m<sup>2</sup> must be maintained. Therefore, in some cases, it may not be possible to use the maximum percentage quoted.



**Diagram 4.3** Layout restrictions on small class D-s3, d2 plastic rooflights, TP(b) rooflights and lighting diffusers

# Requirement B3: Internal fire spread (structure)

These sections deal with the following requirement from Part B of Schedule 1 to the Building Regulations 2010.

Requirement	
<p><i>Requirement</i></p> <p><b>Internal fire spread (structure)</b></p> <p><b>B3.</b> (1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.</p> <p>(2) A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings. For the purposes of this sub-paragraph a house in a terrace and a semi-detached house are each to be treated as a separate building.</p> <p>(3) Where reasonably necessary to inhibit the spread of fire within the building, measures shall be taken, to an extent appropriate to the size and intended use of the building, comprising either or both of the following:</p> <p>(a) sub-division of the building with fire-resisting construction;</p> <p>(b) installation of suitable automatic fire suppression systems.</p> <p>(4) The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.</p>	<p><i>Limits on application</i></p> <p>Requirement B3(3) does not apply to material alterations to any prison provided under section 33 of the Prison Act 1952.</p>

## Intention

In the Secretary of State's view, requirement B3 is met by achieving all of the following.

- a. For defined periods, loadbearing **elements of structure** withstand the effects of fire without loss of stability.
- b. Compartmentation of **buildings** by **fire resisting** construction elements.
- c. Protection of openings in **fire-separating elements** to maintain continuity of the fire separation.
- d. Inhibition of the unseen spread of fire and smoke in hidden voids.

## Section 5: Internal fire spread – houses

### Loadbearing elements of structure

#### Fire resistance standard

- 5.1** Elements such as structural frames, beams, columns, loadbearing walls (internal and external), floor structures and gallery structures should have, as a minimum, the fire resistance given in Appendix B, table B2.
- 5.2** If one element of structure supports or stabilises another, as a minimum the supporting element should have the same fire resistance as the other element.
- 5.3** The following are not considered to be elements of structure.
- A structure that supports only a roof, unless either of the following applies.
    - The roof functions as a floor – such as a roof terrace or means of escape.
    - The structure is essential for the stability of an external wall that needs to be fire resisting.
  - The lowest floor of the building.

#### Floors in loft conversions

- 5.4** Where adding an additional storey to a two-storey single family dwellinghouse, both old and new floors should have 30 minutes' fire resistance.

The existing first-storey construction should have a minimum of R 30. The fire performance may be reduced for integrity and insulation, when all of the following conditions are met.

- Only one storey is added, containing a maximum of two habitable rooms.
- The new storey has a total maximum area of 50m<sup>2</sup>.
- The floor separates only rooms and not circulation spaces.

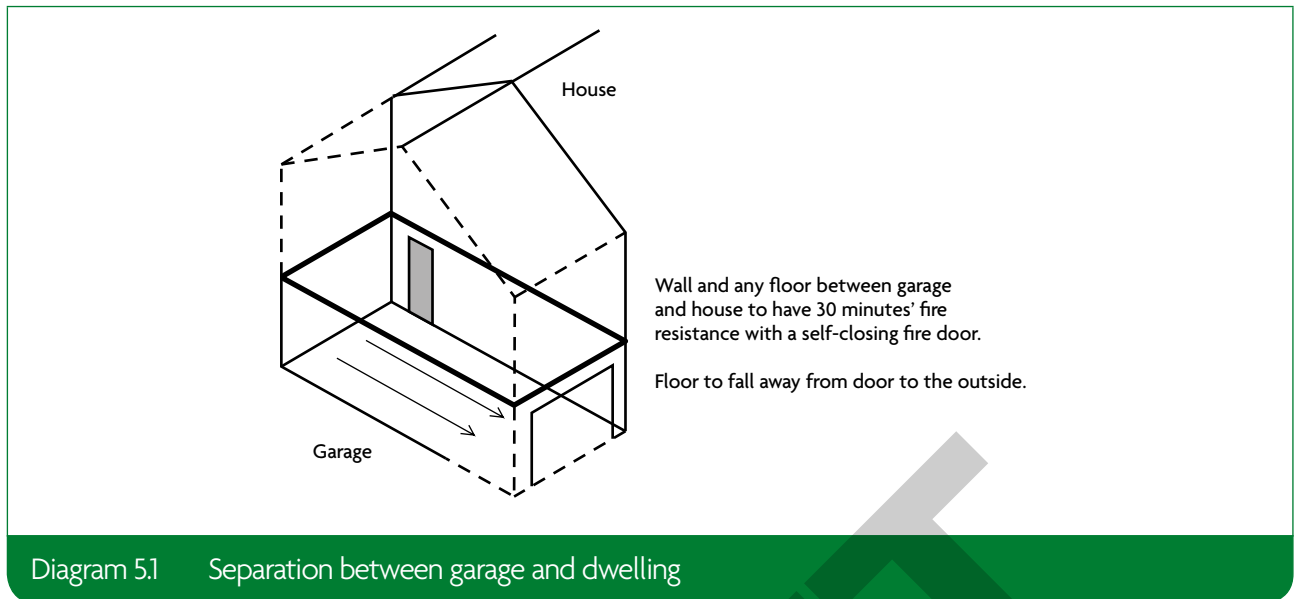
A floor forming part of the enclosure to the circulation space between the loft conversion and the final exit should achieve a minimum rating of REI 30.

### Compartmentation

#### Provision of compartmentation

- 5.5** Dwellings that are semi-detached or in terraces should be considered as separate buildings. Every wall separating the houses should be constructed as a compartment wall (minimum REI 60).
- 5.6** If a domestic garage is attached to or forms an integral part of a dwelling, the garage should be separated from the rest of the dwelling with fire resisting construction (minimum REI 30) (diagram 5.1).
- 5.7** Where a door is provided between a dwelling and the garage, it should meet one of the following conditions.
- The garage floor should be laid such that it falls away from the door to the outside, to allow fuel spills to flow away.
  - The door opening should be a minimum of 100mm above the level of the garage floor.





## Construction of compartment walls and compartment floors

### General

- 5.8** All **compartment walls** and **compartment floors** should achieve both of the following.
- Form a complete barrier to fire between the **compartments** they separate.
  - Have a minimum fire resistance of REI 30 for a **building** with a top **storey** a maximum of 5m above ground level; otherwise REI 60.

### Compartment walls between buildings

- 5.9** Adjoining **buildings** should only be separated by walls, not floors. **Compartment walls** common to two or more **buildings** should achieve both of the following.
- Run the full **height** of the **building** in a continuous vertical plane.
  - Be continued through any roof space to the underside of the roof.

### Junction of compartment wall with roof

- 5.10** A **compartment wall** should achieve both of the following.
- Meet the underside of the roof covering or deck, with fire-stopping to maintain the continuity of fire resistance.
  - Be continued across any eaves.
- 5.11** To reduce the risk of fire spreading over the roof from one **compartment** to another, either of the following conditions should be met.
- Extend the wall through the roof for a minimum of either of the following.
    - Where the height difference between the two roofs is less than 375mm, 375mm above the top surface of the adjoining roof covering (diagram 5.2a).
    - 200mm above the top surface of the adjoining roof covering where either of the following applies.
      - The height difference between the two roofs is 375mm or more.

2. The roof coverings either side of the wall are of a material classified as  $B_{ROOF}(t4)$ .

b. Meet both of the following conditions.

- i. A zone of the roof 1500mm wide on either side of the wall should have a covering classified as  $B_{ROOF}(t4)$ .
- ii. Any combustible boarding used as a substrate to the roof covering, any wood wool slabs and any timber tiling battens that extend over the **compartment wall** should be fully bedded in mortar or other suitable material over the width of the wall (diagram 5.2b).

Double-skinned insulated roof sheeting with a thermoplastic core should incorporate a minimum 300mm wide band of material rated class A2-s3, d2 or better, centred over the wall.

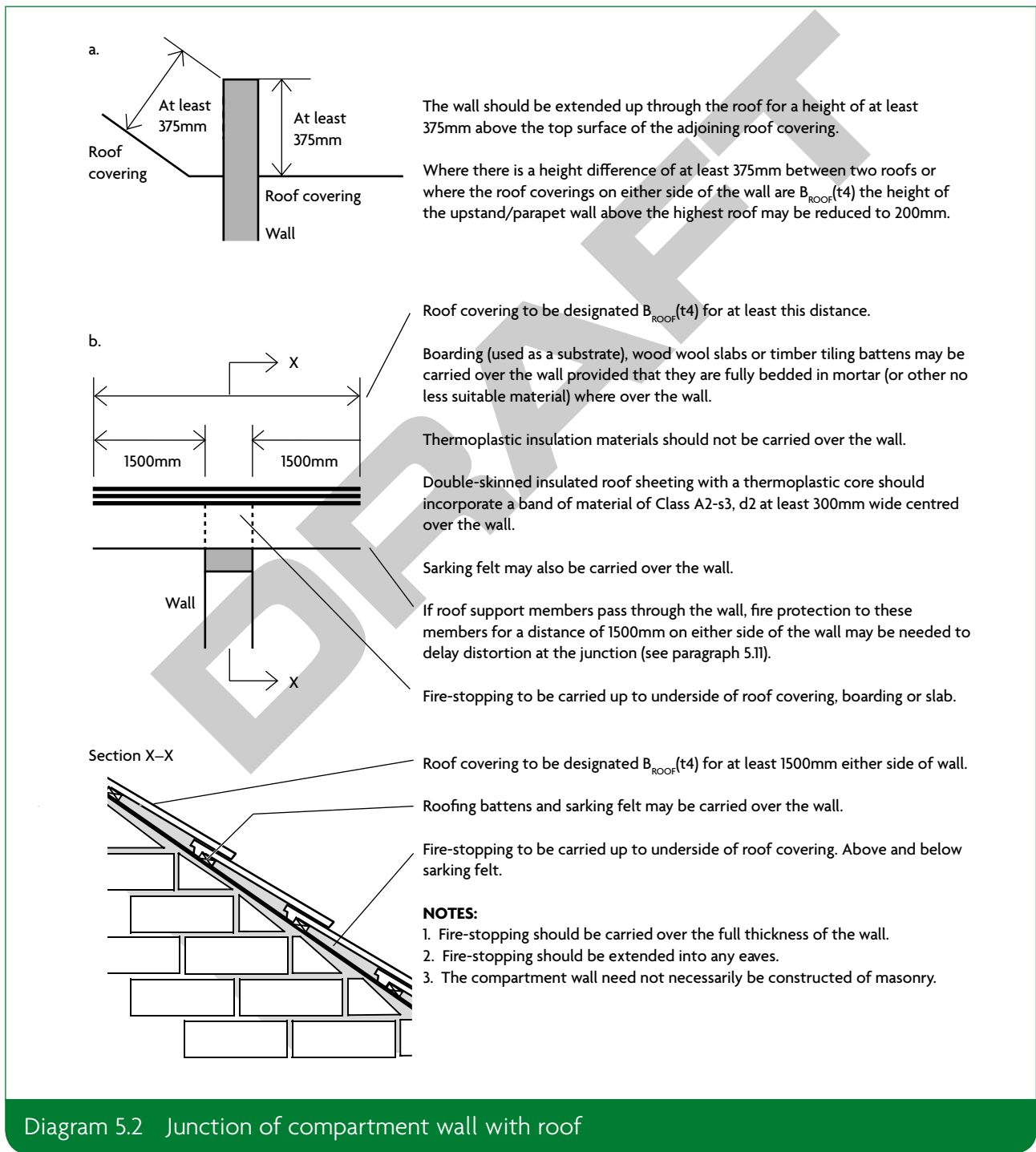


Diagram 5.2 Junction of compartment wall with roof

## Concealed spaces (cavities)

### Provision of cavity barriers

**5.12** Where cavities could create a pathway around a fire-separating element, cavity barriers should be provided for both of the following.

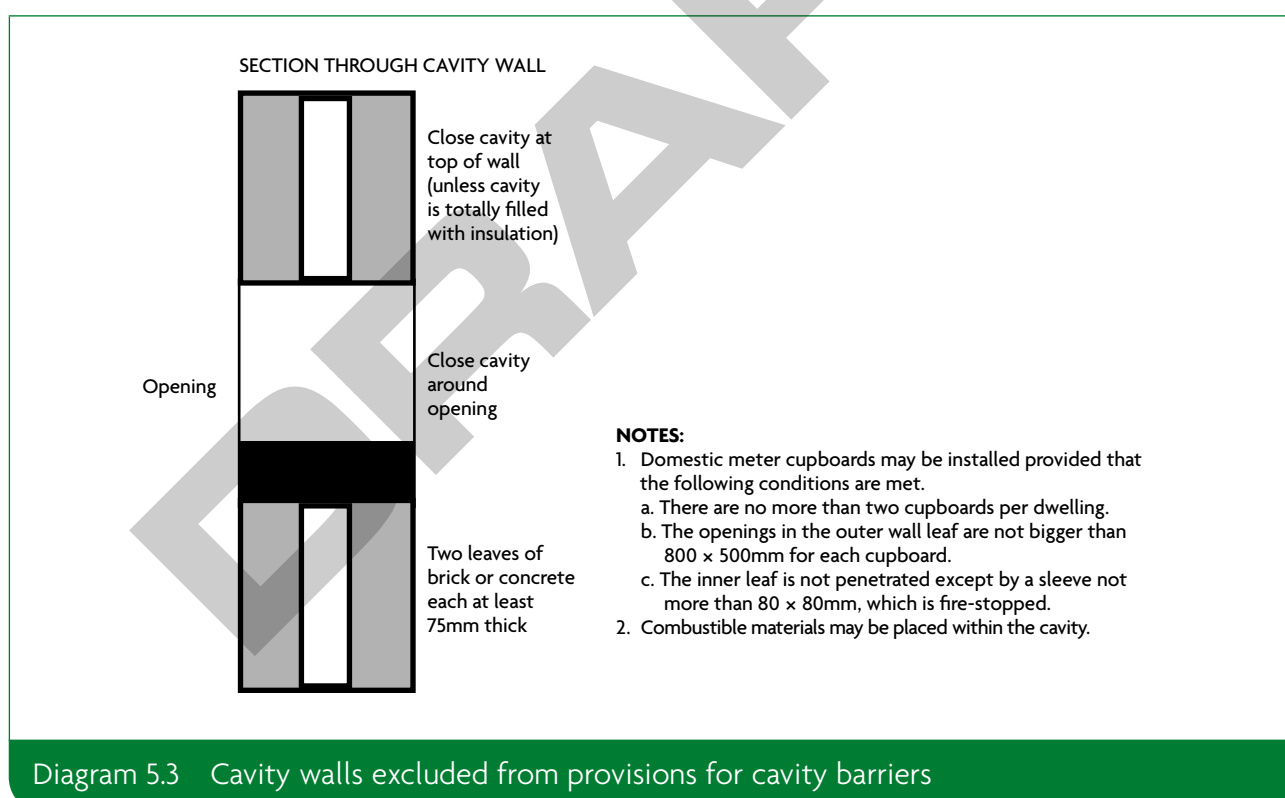
- They should be provided to divide the cavity (including extensive cavities).
- They should be provided to close the edges of cavities.

Cavity barriers should not be confused with fire-stopping details (section 9).

**5.13** Except where a cavity wall meets the conditions of diagram 5.3, cavity barriers should be provided at all of the following.

- At the edges of cavities, including around openings.
- At the junction of an external cavity wall and compartment wall separating buildings.
- At the top of the cavity where the wall meets the roof.

**5.14** It is not appropriate to complete a line of compartment walls by fitting cavity barriers above them. The wall should be extended to the underside of the floor or roof above.



### Construction and fixings for cavity barriers

**5.15** Every cavity barrier should provide a minimum fire resistance of E 30. Cavity barriers may be formed by a construction provided for another purpose if it achieves a fire rating of E 30 and I 15.

- 5.16** **Cavity barriers** in a stud wall or partition, or provided around openings, may be formed of any of the following.
- Steel, a minimum of 0.5mm thick (including as a window or door frame).
  - Timber, a minimum of 38mm thick (including as a window or door frame).
  - Polythene-sleeved mineral wool, or mineral wool slab, under compression when installed in the cavity.
  - Calcium silicate, cement-based or gypsum-based boards, a minimum of 12mm thick.
- 5.17** **Cavity barriers** should be tightly fitted to a rigid construction and mechanically fixed in position. If this is not possible (e.g. where a **cavity barrier** joins to slates, tiles, corrugated sheeting or similar materials) the junction should be fire-stopped.
- 5.18** **Cavity barriers** should be fixed so their performance is unlikely to be made ineffective by any of the following.
- Movement of the **building** due to subsidence, shrinkage or temperature change, and movement of the external envelope due to wind.
  - During a fire, collapse of services penetrating the **cavity barriers**.
  - During a fire, failure of the **cavity barrier** fixings. (In roof spaces, where **cavity barriers** are fixed to roof members, there is no expectation of fire resistance from roof members provided for the purpose of support.)
  - During a fire, failure of any material or construction to which **cavity barriers** join or by which they are supported. (For example, a **suspended ceiling** that continues over a **fire resisting** wall or partition collapses, and the **cavity barrier** fails prematurely because the **ceiling** was not designed to provide a minimum fire resistance of EI 30.)

### Openings in cavity barriers

- 5.19** Openings should be limited to the following.
- Fire doorsets** with a minimum E 30 rating and fitted in accordance with Appendix C.
  - The passage of **pipes** that follow the provisions in section 9.
  - The passage of cables or conduits containing one or more cables.
  - Openings fitted with a suitably mounted automatic **fire damper**.
  - Ducts that are either of the following.
    - Fire resisting** (minimum E 30).
    - Fitted with a suitably mounted automatic **fire damper** where they pass through the **cavity barrier**.

## Section 6: Loadbearing elements of structures – flats

### Fire resistance standard

- 6.1** As a minimum, **elements of structure** should have the fire resistance given in Appendix B.
- 6.2** The following are excluded from the definition of ‘**element of structure**’.
- a. A structure that supports only a roof, unless either of the following applies.
    - i. The roof performs the function of a floor, such as for parking vehicles or as a **means of escape**.
    - ii. The structure is essential for the stability of an **external wall** that needs to be **fire resisting**.
  - b. The lowest floor of the **building**.
  - c. A **platform floor**.
  - d. A loading **gallery**, fly **gallery**, stage grid, lighting bridge or any **gallery** provided for similar purposes or for maintenance and repair.

### Additional guidance

- 6.3** If a loadbearing wall is any of the following, guidance in other sections may also apply.
- a. A **compartment wall** (including a wall common to two **buildings**): section 7.
  - b. Enclosing a **place of special fire hazard**: section 7.
  - c. Protecting a **means of escape**: sections 2 and 3.
  - d. An **external wall**: sections 10 and 11.
  - e. Enclosing a **firefighting shaft**: section 15.
- 6.4** If a floor is also a **compartment floor**, see section 7.

### Conversion to flats

- 6.5** Where an existing house or other **building** is converted into **flats**, retained timber floors may make it difficult to meet the relevant provisions for fire resistance.
- 6.6** In a converted **building** with a maximum of three **storeys**, a minimum REI 30 fire resistance could be accepted for elements of structure if the **means of escape** meet both of the following conditions.
- a. Conform to section 3.
  - b. Are adequately protected.
- 6.7** In a converted **building** with four or more **storeys**, the full standard of fire resistance given in Appendix B is normally necessary.

## Section 7: Compartmentation – flats

### Provision of compartmentation

- 7.1 All of the following should achieve a fire resistance of minimum REI 60.
- Any floor and wall separating a flat from another part of the building.
  - Any wall enclosing a refuse storage chamber.
  - Any wall common to two or more buildings.

### Construction of compartment walls and compartment floors

#### General

- 7.2 All compartment walls and compartment floors should achieve both of the following.
- Form a complete barrier to fire between the compartments they separate.
  - Have the appropriate fire resistance, as given in Appendix B, tables B1 and B2.
- 7.3 Timber beams, joists, purlins and rafters may be built into or carried through a masonry or concrete compartment wall if the openings for them are both:
- as small as practicable
  - fire-stopped.

If trussed rafters bridge the wall, failure of the truss due to a fire in one compartment should not cause failure of the truss in another compartment.

#### Compartment walls between buildings

- 7.4 Adjoining buildings should only be separated by walls, not floors. Compartment walls common to two or more buildings should meet the following conditions.
- Run the full height of the building in a continuous vertical plane.
  - Be continued through any roof space to the underside of the roof (see diagram 5.2).

#### Protected shafts

- 7.5 Stairs and service shafts connecting compartments should be protected to restrict the spread of fire between the compartments. These are called protected shafts. Walls or floors surrounding a protected shaft are considered to be compartment walls or compartment floors.

## Junction of compartment wall or compartment floor with other walls

- 7.6** At the junction with another **compartment wall** or an **external wall**, the fire resistance of the compartmentation should be maintained. **Fire-stopping** that meets paragraphs 9.23 to 9.28 should be provided.
- 7.7** At the junction of a **compartment floor** and an **external wall** with no fire resistance (such as a curtain wall), the **external wall** should be restrained at floor level. The restraint should reduce movement of the wall away from the floor if exposed to fire.
- 7.8** **Compartment walls** should be able to accommodate deflection of the floor, when exposed to fire, by either of the following means.
- Between the wall and floor, provide a head detail that is capable maintaining its integrity while deforming.
  - b. Design the wall so it maintains its integrity by resisting the additional vertical load from the floor above.

Where **compartment walls** are located within the middle half of a floor between vertical supports, the deflection may be assumed to be 40mm unless a smaller value can be justified by assessment. Outside this area, the limit can be reduced linearly to zero at the supports.

For steel beams that do not have the required fire resistance, reference should be made to SCI Publication P288.

## Junction of compartment wall with roof

- 7.9** The requirements are the same as for houses, detailed in paragraphs 5.10 and 5.11.

## Openings in compartmentation

- 7.10** Openings in a **compartment wall** common to two or more **buildings** should be limited to those for either of the following.
- A door providing a **means of escape**, that has the same fire resistance as the wall.
  - The passage of a **pipe** that meets the provisions in section 9.

## Section 8: Concealed spaces (cavities) – flats

### Provision of cavity barriers

- 8.1 Where cavities could create a pathway around a fire-separating element, cavity barriers should be provided for both of the following.
- They should be provided to divide the cavity (including extensive cavities).
  - They should be provided to close the edges of cavities.
- See diagram 8.1. Cavity barriers should not be confused with fire-stopping details (section 9).

### Pathways around fire-separating elements

#### Junctions and cavity closures

- 8.2 Except where a wall meets the conditions of diagram 8.2, cavity barriers should be provided at all of the following.
- At the edges of cavities, including around openings.
  - At the junction between an external cavity wall and every compartment floor and compartment wall.
  - At the junction between an internal cavity wall and every compartment floor, compartment wall or other wall or door assembly forming a fire resisting barrier.
- 8.3 It is not appropriate to complete a line of compartment walls by fitting cavity barriers above them. The wall should be extended to the underside of the floor or roof above.

#### Protected escape routes

- 8.4 If the fire resisting construction of a protected escape route is either of the following.
- Not carried to full storey height.
  - Not carried to the underside of the roof covering at the top storey.
- Then the cavity above or below the fire resisting construction should be either:
- fitted with cavity barriers on the line of the enclosure
  - for cavities above the fire resisting construction, enclosed on the lower side by a fire resisting ceiling (minimum EI 30) that extends throughout the building, compartment or separated part (see diagram 8.3).

#### Cavities affecting alternative escape routes

- 8.5 In divided corridors, cavity barriers may be needed to prevent alternative escape routes being affected by fire and/or smoke (section 3).



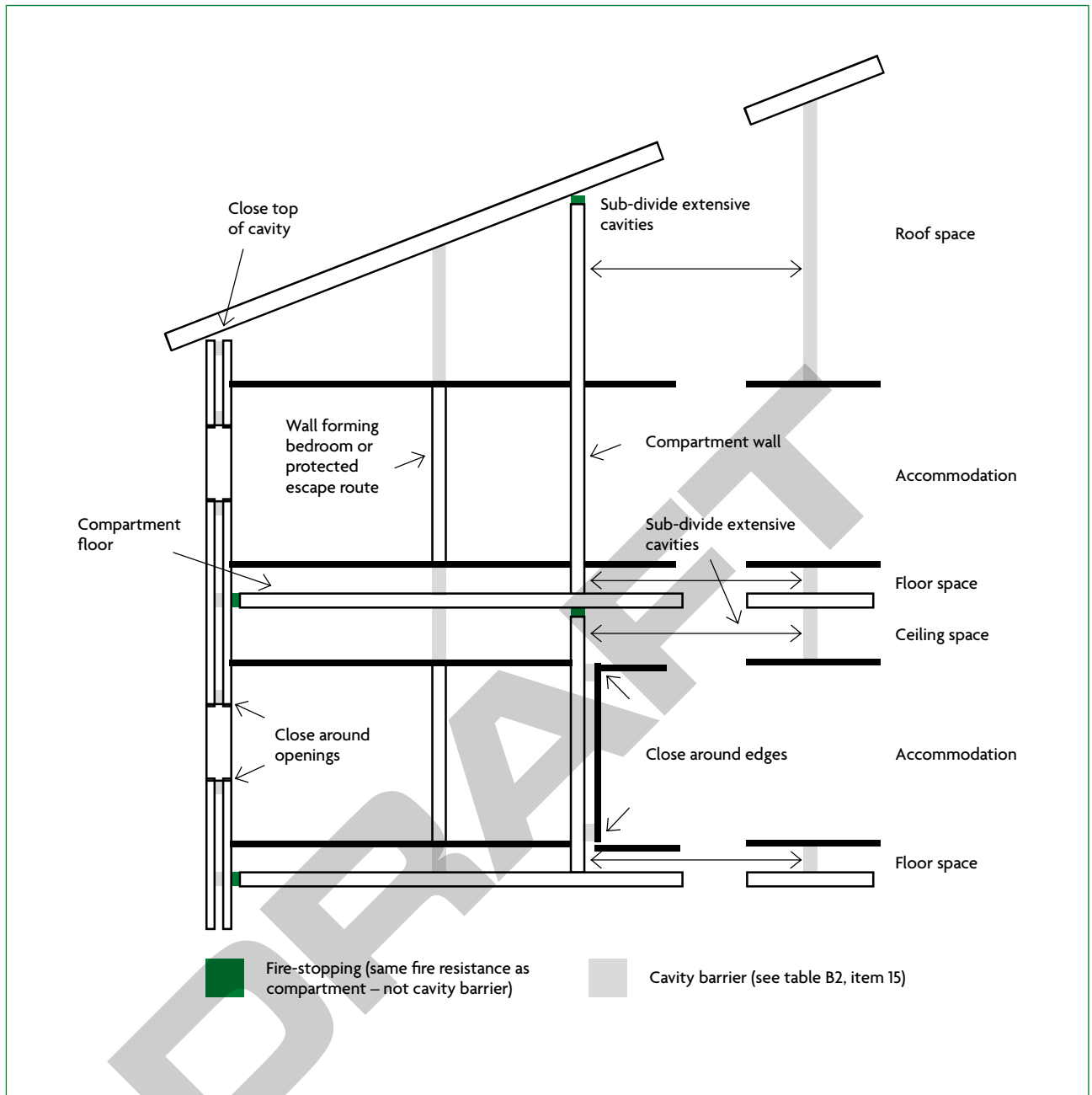


Diagram 8.1 Provisions for cavity barriers

## Double-skinned corrugated or profiled roof sheeting

**8.6** Cavity barriers are not required between double-skinned corrugated or profiled insulated roof sheeting, if the sheeting complies with all of the following.

- The sheeting is rated class A2-s3, d2 or better.
- Both surfaces of the insulating layer have a minimum surface spread of flame rating of class C-s3, d2.
- Both surfaces of the insulating layer make contact with the inner and outer skins of cladding (diagram 8.4).

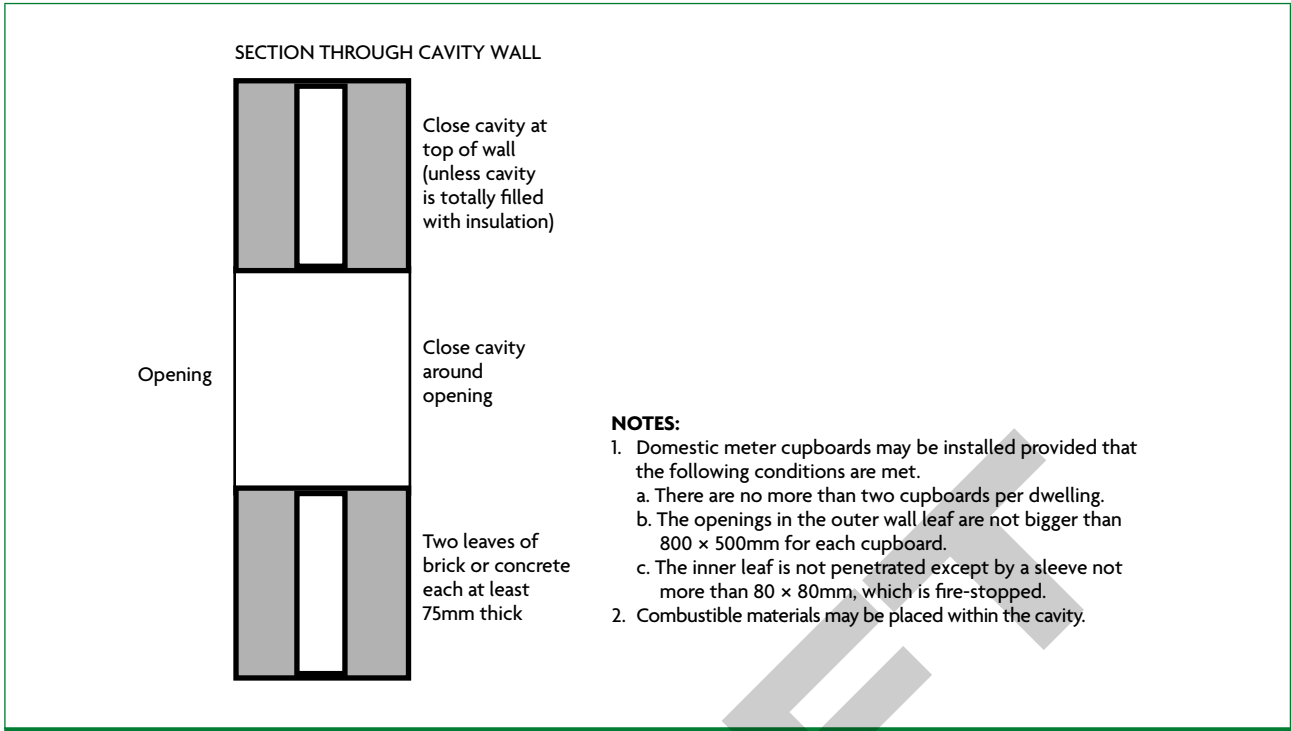


Diagram 8.2 Cavity walls excluded from provisions for cavity barriers

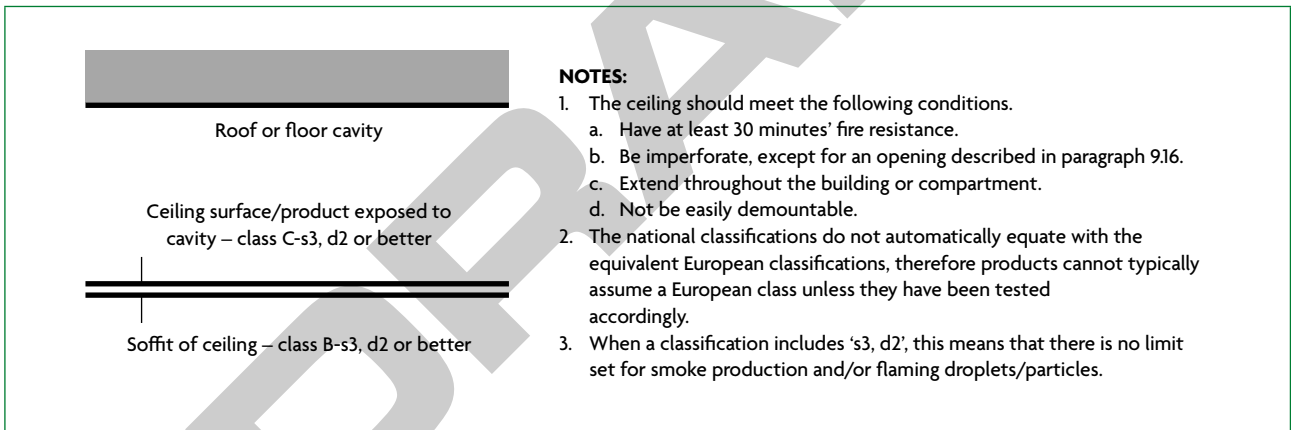


Diagram 8.3 Fire resisting ceiling below concealed space

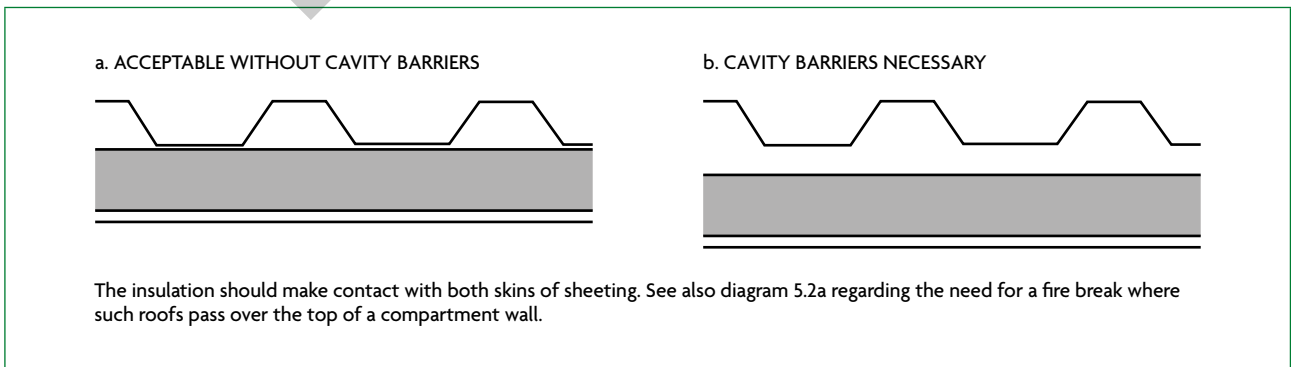


Diagram 8.4 Provisions for cavity barriers in double-skinned insulated roof sheeting

## Extensive cavities

### Maximum dimensions of concealed spaces

**8.7** Where domestic accommodation forms part of a mixed use unit, **cavity barriers** should be used to divide any cavity (including roof spaces). Table 8.1 sets out maximum dimensions for undivided **concealed spaces**.

**Table 8.1 Maximum dimensions of cavities in non-domestic uses (purpose groups 2–7)**

Location of cavity	Class of surface/product exposed in cavity (excluding the surface of any pipe, cable or conduit, or any insulation to any pipe)	Maximum dimensions in any direction (m)
Between roof and ceiling	Any	20
Any other cavity	Any of: <ul style="list-style-type: none"> <li>a. class A1</li> <li>b. class A2-s3, d2</li> <li>c. class B-s3, d2</li> <li>d. class C-s3, d2</li> </ul>	20
	None of the above classes	10

- 8.8** Table 8.1 does not apply to any of the following cavities.
- a. A cavity in a wall that is **fire resisting** only because it is loadbearing.
  - b. A cavity in a wall that meets the conditions of diagram 8.2.
  - c. A floor or roof cavity above a **fire resisting ceiling** (diagram 8.3) that extends throughout the **building** or **compartment** to a maximum of 30m.
  - d. A cavity that does not contain combustible insulation and is formed either:
    - i. behind the external skin of an external cladding system with a masonry or concrete inner leaf a minimum of 75mm thick
    - ii. by overcladding an existing masonry (or concrete) **external wall** or an existing concrete roof.
  - e. A cavity that meets the conditions of paragraph 8.6.
  - f. A cavity below a floor next to the ground or next to oversite concrete, if either:
    - i. the cavity is less than 1000mm in height
    - ii. the cavity is not normally accessible by people, unless there are openings in the floor such that it is possible for combustibles to accumulate in the cavity (in which case **cavity barriers** should be provided and access should be provided to the cavity for cleaning).
- 8.9** If a single **room** with a **ceiling** or underfloor cavity exceeds the dimensions in table 8.1, **cavity barriers** need only be provided on the line of the enclosing walls/partitions of that **room**, if both of the following are true.
- a. The **cavity barriers** are a maximum of 40m apart.
  - b. The surface of the material/product exposed in the cavity is class C-s3, d2 or better.

- 8.10** If the undivided area exceeds 40m in one or both directions, there is no limit to its size if all of the following are met.
- a. Together, the room and cavity form a compartment separated by fire resisting construction from the rest of the building.
  - b. Both of the following apply.
    - i. The building is fitted with an automatic fire detection and alarm system meeting **BS 5839-1**.
    - ii. To satisfy **BS 5839-1**, detectors are only required in the cavity.
  - c. Both of the following apply.
    - i. The cavity is used as a plenum.
    - ii. The recommendations for recirculating air distribution systems in **BS 9999** are followed.
  - d. Both of the following apply.
    - i. The exposed surface of the material/product used in the construction of the cavity is class B-s3, d2 or better.
    - ii. The supports and fixings in the cavity are class A1.
  - e. The flame spread rating of any pipe insulation system is class C-s3, d2 or better.
  - f. Any electrical wiring in the void is laid in metal trays or metal conduit.
  - g. Other than those in d–f, any materials are class A2-s3, d2 or better.

## Construction and fixings for cavity barriers

- 8.11** Cavity barriers, tested from each side separately, should provide a minimum of both of the following:
- a. 30 minutes' integrity (E 30)
  - b. 15 minutes' insulation (I 15).
- 8.12** Cavity barriers should meet the requirements set out in paragraphs 5.15 to 5.18.
- 8.13** If a cavity barrier is provided in accordance with paragraph 8.6 and the partition is not a fire resisting partition, then paragraph 5.18 does not apply. However, both of the following apply.
- a. The number of openings in the barrier should be kept to a minimum.
  - b. Any penetrations should be sealed to restrict the passage of smoke with an approved fire-stopping material.

# Section 9: Protection of openings and fire-stopping

## Introduction

9.1 The performance of a **fire-separating element** should not be impaired. Every joint, imperfect fit and opening for services should be sealed. Fire-stopping delays the spread of fire and, generally, the spread of smoke as well.

## Openings for pipes

9.2 Pipes passing through a **fire-separating element**, unless in a **protected shaft**, should meet one of the alternatives A, B or C below.

### Alternative A: Proprietary seals (any pipe diameter)

9.3 Provide a proprietary, tested sealing system that will maintain the fire resistance of the wall, floor or **cavity barrier**.

### Alternative B: Pipes with a restricted diameter

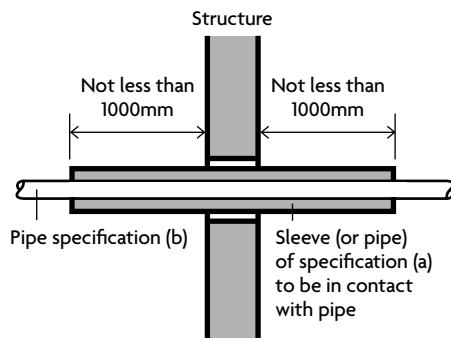
9.4 Where a proprietary sealing system is not used, **fire-stop** around the **pipe**, keeping the opening as small as possible. The nominal internal diameter of the **pipe** should not exceed the relevant dimension given in table 9.1. The diameter given in table 9.1 for pipes of specification (b) used in situation 2 assumes that the pipes are part of an above-ground drainage system and are enclosed as shown in diagram 9.4. If they are not, the smaller diameter given for situation 3 should be used.

### Alternative C: Sleeving

9.5 A **pipe** with a maximum nominal internal diameter of 160mm may be used with a class A1 sleeving, as shown in diagram 9.1, the **pipe** is made of one of the following.

- a. Lead.
- b. Aluminium.
- c. Aluminium alloy.
- d. Fibre-cement.
- e. uPVC.

The specification for non-combustible and uPVC **pipes** is given in the notes to table 9.1.



**NOTES:**

1. Make the opening in the structure as small as possible and provide fire-stopping between pipe and structure.
2. See table 9.1 for materials specification.
3. The sleeve should be class A1.

Diagram 9.1 Pipes penetrating structure

**Table 9.1 Maximum nominal internal diameter of pipes passing through a compartment wall/floor**

Situation	Pipe material and maximum nominal internal diameter (mm)		
	(a) Non-combustible material <sup>(1)</sup>	(b) Lead, aluminium, aluminium alloy, uPVC, <sup>(2)</sup> fibre cement	(c) Any other material
1. Structure (but not a wall separating buildings) enclosing a protected shaft that is not a stair or a lift shaft	160	110	40
2. Compartment wall or compartment floor between flats	160	160 (stack pipe) <sup>(3)</sup> 110 (branch pipe) <sup>(3)</sup>	40
3. Any other situation	160	40	40

**NOTES:**

1. Any material rated class A1 (such as cast iron, copper or steel) which, if exposed to a temperature of 800°C, will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.
2. uPVC pipes that comply with **BS 4514**, and uPVC pipes that comply with **BS 5255**.
3. These diameters are only in relation to pipes that form part of an above-ground drainage system and are enclosed as shown in diagram 9.4. In other cases, the maximum diameters given for situation 3 apply.

## Mechanical ventilation and air-conditioning systems

### General

- 9.6** Ductwork should not help to transfer fire and smoke through the **building**. Exhaust points should be sited away from **final exits**, combustibile building cladding or roofing materials and openings into the **building**.
- 9.7** Ventilation ducts supplying or extracting air directly to or from a **protected stairway** should not also serve other areas. A separate ventilation system should be provided for each **protected stairway**.
- 9.8** A **fire and smoke damper** should be provided where ductwork enters each section of the **escape route** it serves. It should be operated by a smoke detector or suitable fire detection system. **Fire and smoke dampers** should close when smoke is detected.
- 9.9** In a system that recirculates air, smoke detectors should be fitted in the extract ductwork before both of the following.
- The point where recirculated air is separated from air to be discharged to outside.
  - Any filters or other air cleaning equipment.
- When smoke is detected, detectors should do one of the following to divert smoke outside the **building**.
- Cause the system to immediately shut down.
  - Switch the ventilation system from recirculating mode to extraction.
- 9.10** In mixed use **buildings**, non-domestic kitchens, car parks and plant rooms should have separate and independent extraction systems. Extracted air should not be recirculated.
- 9.11** Ventilation and air-conditioning systems should be compatible with smoke control systems when operating under fire conditions.

### Ventilation ducts and flues passing through fire-separating elements

#### General

- 9.12** If air handling ducts pass through **fire-separating elements**, the integrity of the elements should be maintained using one or more of the following four methods. In most ductwork systems, a combination of the four methods is best to combat potential fire dangers.
- Method 1 – thermally activated **fire dampers**.
  - Method 2 – **fire resisting** enclosures.
  - Method 3 – protection using **fire resisting** ductwork.
  - Method 4 – automatically activated **fire and smoke dampers** triggered by smoke detectors.
- 9.13** Further information on **fire resisting** ductwork is given in the ASFP Blue Book.

## Flats and dwellings

**9.14** Where ducts pass between fire-separating elements to serve multiple flats or dwellings, fire dampers or fire and smoke damper should be actuated by both of the following.

- Smoke detector-controlled automatic release mechanisms.
- Thermally actuated devices.

## Kitchen extract

**9.15** Methods 1 and 4 should not be used for extract ductwork serving kitchens. The likely build-up of grease within the duct can adversely affect dampers.

## Ducts passing through protected escape routes

**9.16** Method 1 should not be used for extract ductwork passing through the enclosures of protected escape routes (diagrams 9.2 and 9.3). Large volumes of smoke can pass thermal devices without triggering them.

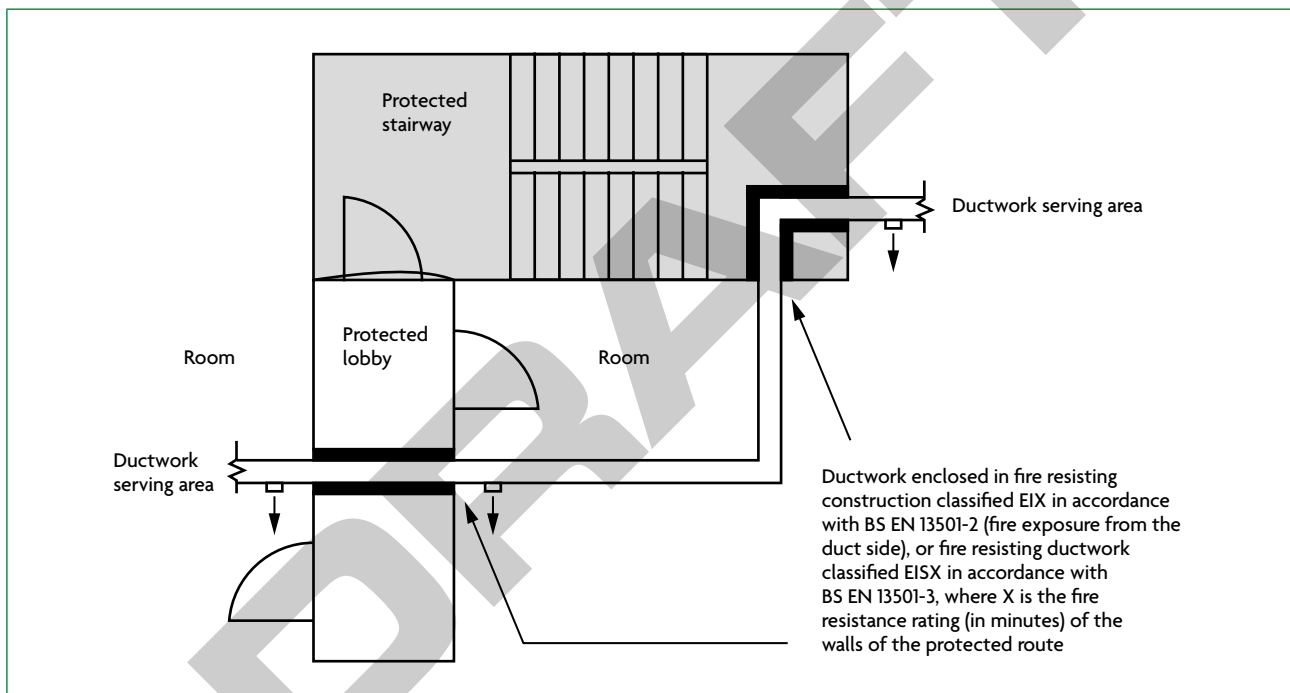
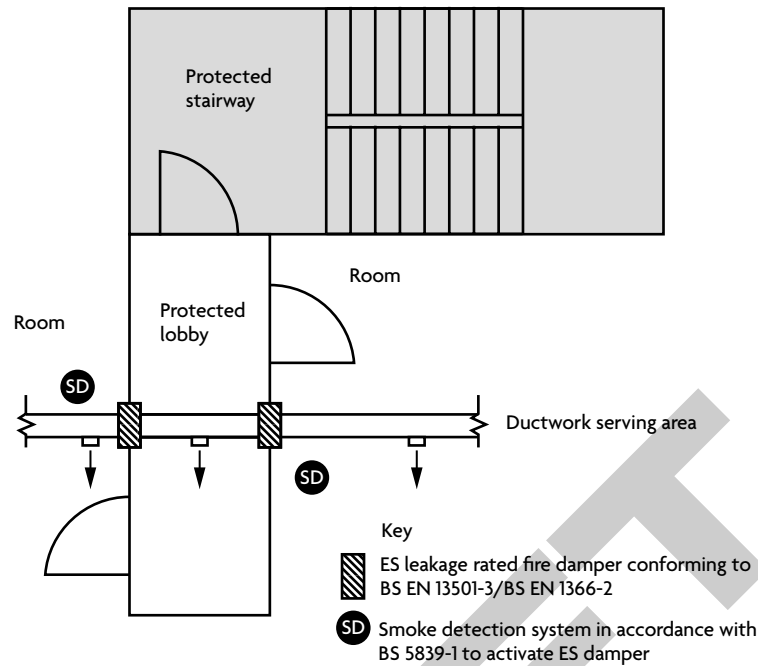


Diagram 9.2 Ductwork passing through protected routes – method 2 or method 3

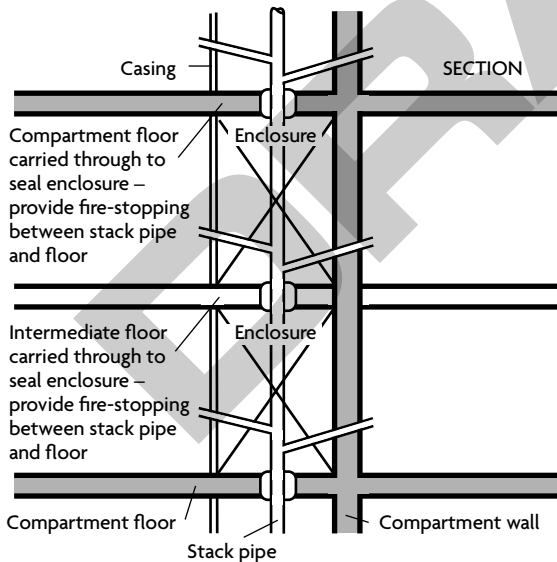
An ES classified fire and smoke damper which is activated by a suitable fire detection system (method 4) may also be used for escape routes.





Ventilation ducts should not supply or extract air directly to or from a protected stairway.

Diagram 9.3 Ductwork passing through protected routes – method 4



**NOTES:**

1. The enclosure should meet the following conditions.
  - a. Be bounded by a compartment wall or floor, an outside wall, an intermediate floor or a casing (see specification at 2 below).
  - b. Have internal surfaces (except framing members) of class B-s3, d2 or better.
 

**NOTE:** When a classification includes 's3, d2', this means that there is no limit set for smoke production and/or flaming droplets/particles).
  - c. Not have an access panel which opens into a circulation space or bedroom.
  - d. Be used only for drainage or water supply or vent pipes for a drainage system.
2. The casing should meet the following conditions.
  - a. Be imperforate except for an opening for a pipe or an access panel.
  - b. Not be of sheet metal.
  - c. Have (including any access panel) not less than 30 minutes' fire resistance.
3. The opening for a pipe, in either the structure or the casing, should be as small as possible and fire-stopped around the pipe.

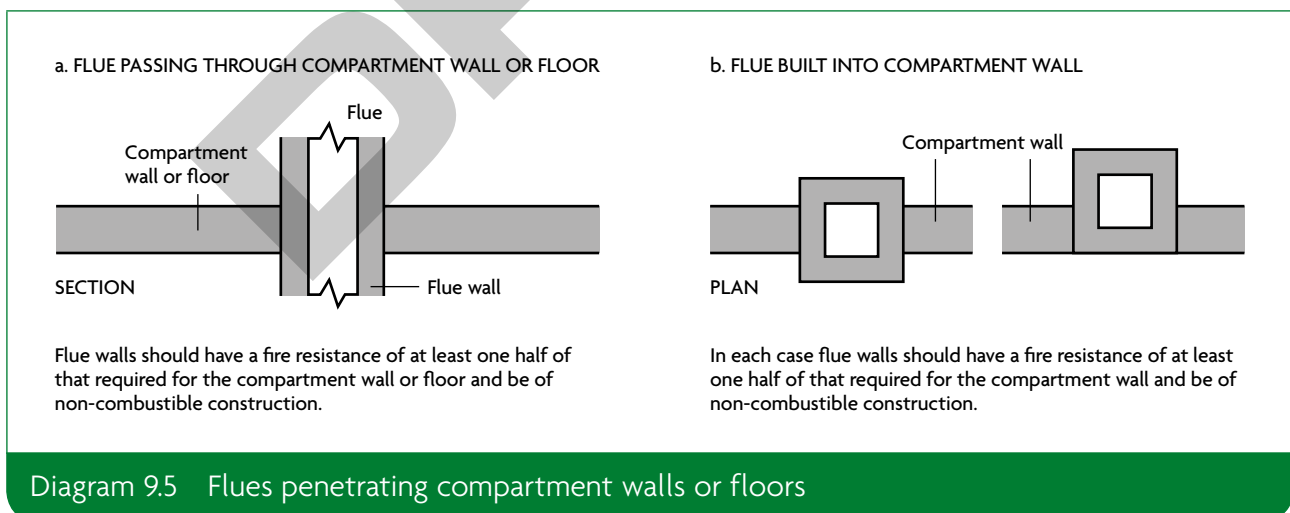
Diagram 9.4 Enclosure for drainage or water supply pipes

## Installation and specification of fire dampers

- 9.17** Both fire dampers and fire and smoke dampers should be all of the following.
- Sited within the thickness of the fire-separating elements.
  - Securely fixed.
  - Sited such that, in a fire, expansion of the ductwork would not push the fire damper through the structure.
- 9.18** Access to the fire damper and its actuating mechanism should be provided for inspection, testing and maintenance.
- 9.19** Fire dampers should meet both of the following.
- Conform to **BS EN 15650**.
  - Have a minimum E classification of 60 minutes.
- 9.20** Fire and smoke dampers should meet both of the following.
- Conform to **BS EN 15650**.
  - Have an ES classification of a minimum of 60 minutes.
- 9.21** Smoke detectors should be sited so as to prevent the spread of smoke as early as practicable and activate the fire and smoke dampers. Smoke detectors and automatic release mechanisms used to activate fire dampers and/or fire and smoke dampers should conform to **BS EN 54-7** and **BS 5839-3** respectively.
- Further information on fire dampers and/or fire and smoke dampers is given in the ASFP Grey Book.

## Flues, etc.

- 9.22** The wall of a flue or duct should have a fire resistance that is at least half of any compartment wall or compartment floor it passes through or is built into (diagram 9.5).



## Fire-stopping

- 9.23** In addition to any other provisions in this section, both of the following should be met.
- Joints between **fire-separating elements** should be fire-stopped.
  - Openings through a **fire resisting** element for **pipes**, ducts, conduits or cable should be all of the following.
    - As few as possible.
    - As small as practicable.
    - Fire-stopped (allowing thermal movement in the case of a **pipe** or duct).
- 9.24** Materials used for fire-stopping should be reinforced with (or supported by) materials rated class A2-s3, d2 or better to prevent displacement in both of the following cases.
- Where the unsupported span is greater than 100mm.
  - Where non-rigid materials are used (unless tested to show their suitability).
- 9.25** Proprietary, tested fire-stopping and sealing systems are available and may be used. Different materials suit different situations, and not all are suitable in every situation.
- 9.26** Other fire-stopping materials include the following.
- Cement mortar.
  - Gypsum-based plaster.
  - Cement-based or gypsum-based vermiculite/perlite mixes.
  - Glass fibre, crushed rock, blast furnace slag or ceramic-based products (with or without resin binders).
  - Intumescent mastics.
- 9.27** Guidance on the design, installation and maintenance of measures to contain fires or slow their spread is given in *Ensuring best practice for passive fire protection in buildings* produced by the Association for Specialist Fire Protection (ASFP).
- 9.28** Further information on generic systems, their suitability for different applications and guidance on test methods, is given in the ASFP Red Book.

## Requirement B4: External fire spread

These sections deal with the following requirement from Part B of Schedule 1 to the Building Regulations 2010.

Requirement	
<i>Requirement</i>	<i>Limits on application</i>
<b>External fire spread</b>	
<p><b>B4.</b> (1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.</p> <p>(2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.</p>	

### Intention

#### Resisting fire spread over external walls

The external envelope of a **building** should not contribute to undue fire spread from one part of a **building** to another part. This intention can be met by constructing **external walls** so that both of the following are satisfied.

- a. The risk of ignition by an external source to the outside surface of the building and spread of fire over the outside surface is restricted.
- b. The materials used to construct **external walls** and how they are assembled do not contribute to the rate of fire spread up the outside of the **building**.

The extent to which this is necessary depends on the **height** of the **building**.

#### Resisting fire spread from one building to another

The external envelope of a **building** should not provide a medium for undue fire spread to adjacent buildings or be readily ignited by fires in adjacent **buildings**. This intention can be met by constructing **external walls** so that all of the following are satisfied.

- a. The risk of ignition by an external source of the outside surface of the **building** is restricted.
- b. The amount of thermal radiation that falls on a neighbouring **building** from window openings and other **unprotected areas** in the **building** on fire is not enough to start a fire in the other **building**.
- c. Flame spread over the roof and/or fire penetration from external sources through the roof is restricted.

The extent to which this is necessary depends on the use of the **building** and its position in relation to adjacent **buildings** and therefore the **site boundary**.

# Section 10: Resisting fire spread from one building to another

## Introduction

- 10.1** The following assumptions enable a reasonable standard of resistance to be specified.
- The size of a fire depends on the compartmentation within the **building**. A fire may involve a complete **compartment**, but will not spread to other **compartments**.
  - The intensity of a fire is related to the building use, but can be moderated by a sprinkler system.
  - Fires in **buildings** including 'residential' and 'assembly and recreation' **purpose group** accommodation represent a greater risk to life.
  - A **building** on the far side of the **boundary** meets both of the following conditions.
    - Has a similar elevation to the one in question.
    - Is the same distance as the one in question from the common **boundary**.
  - The radiated heat passing through any part of the **fire resisting external wall** may be discounted.
- 10.2** If a reduced separation distance between **buildings**, or increased amount of **unprotected area**, is required, smaller **compartments** should be considered.

## Boundaries

- 10.3** The fire resistance of a wall depends on its distance from the **relevant boundary** (see diagram 10.1). Separation distances are measured to boundaries to ensure that the location and design of **buildings** on adjoining **sites** have no influence on the building under consideration.
- 10.4** The **boundary** that a wall faces is the **relevant boundary** (diagram 10.2). It may be one of the following.
- The **site boundary**.
  - The centre line of a space where further development is unlikely.
  - An assumed **notional boundary** between two **buildings** on the same **site** (diagram 10.3) where either of the following conditions is met.
    - One or both of the **buildings** are in the 'residential' or 'assembly and recreation' **purpose groups**.
    - The **buildings** will be operated/managed by different organisations.

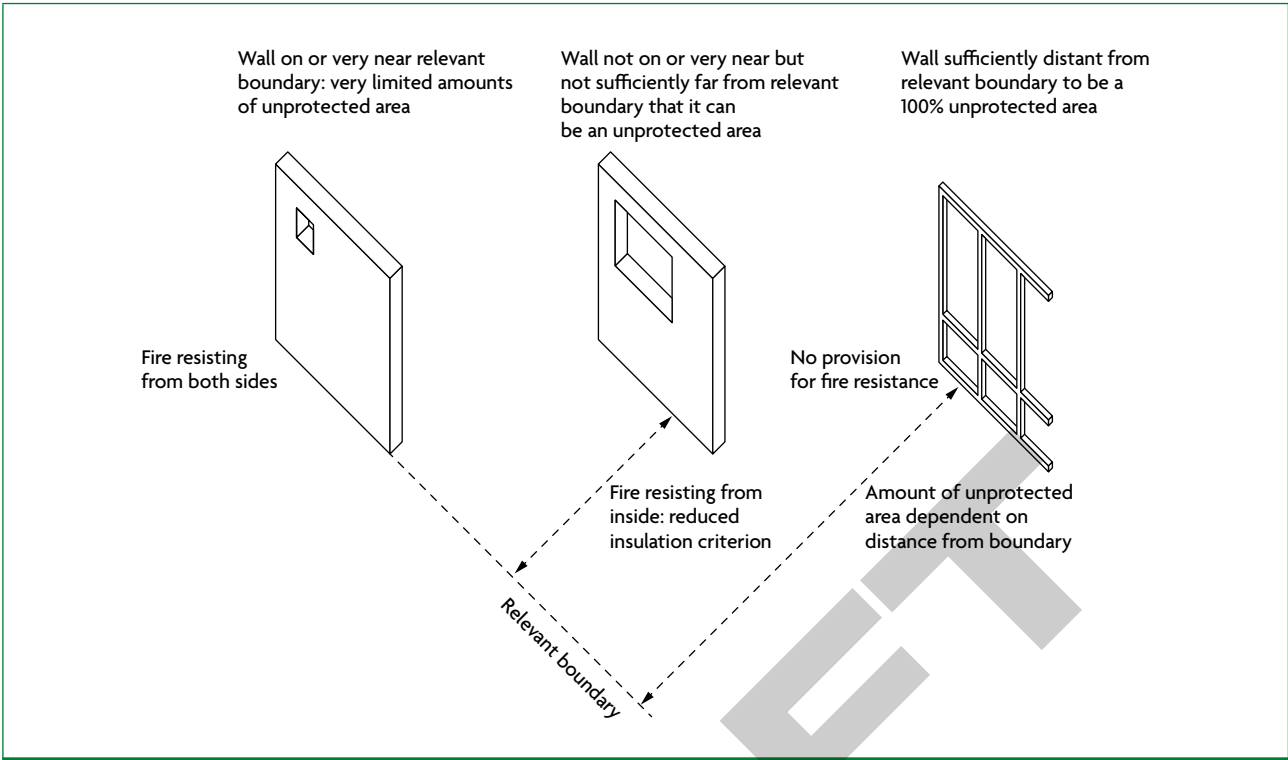


Diagram 10.1 Principles of space separation

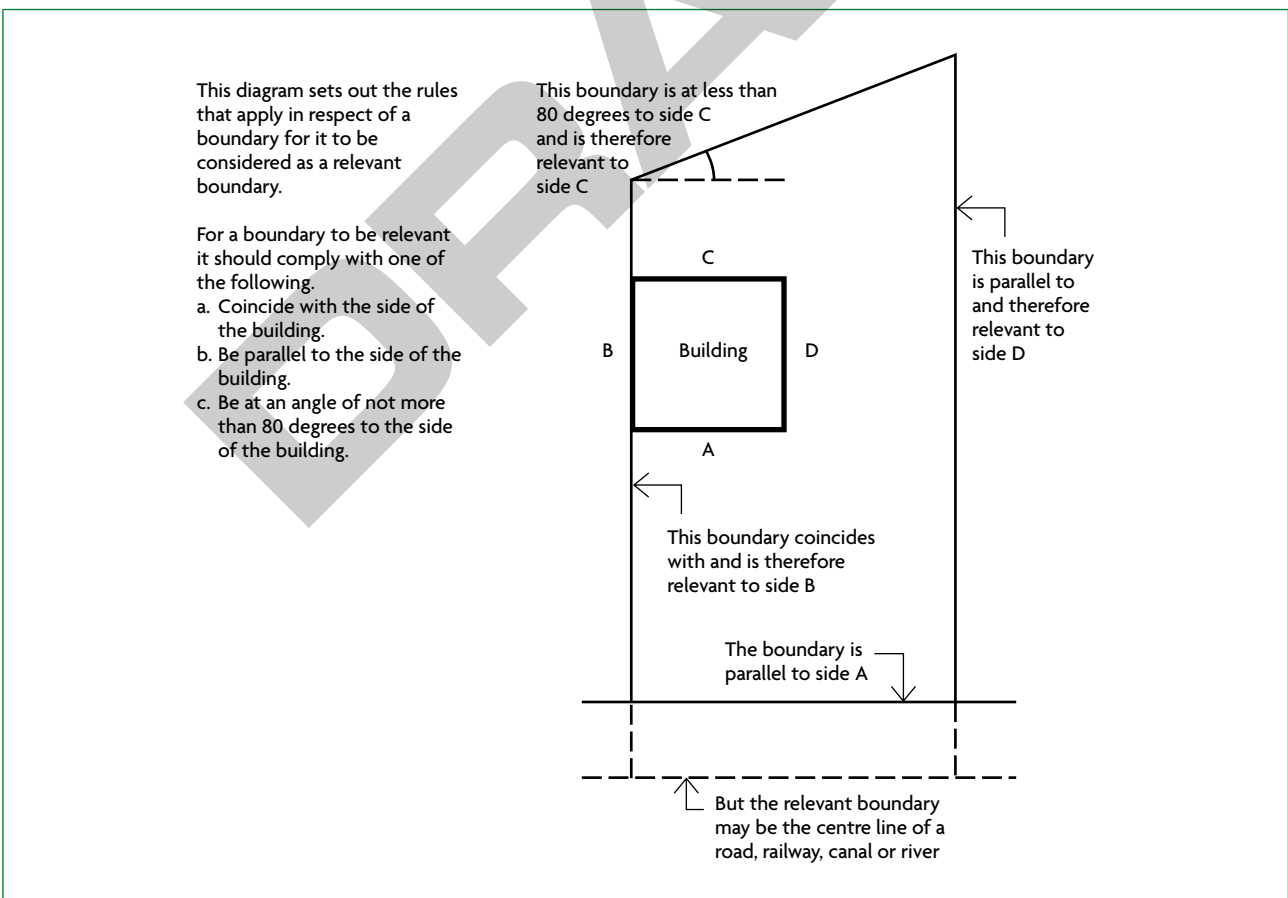
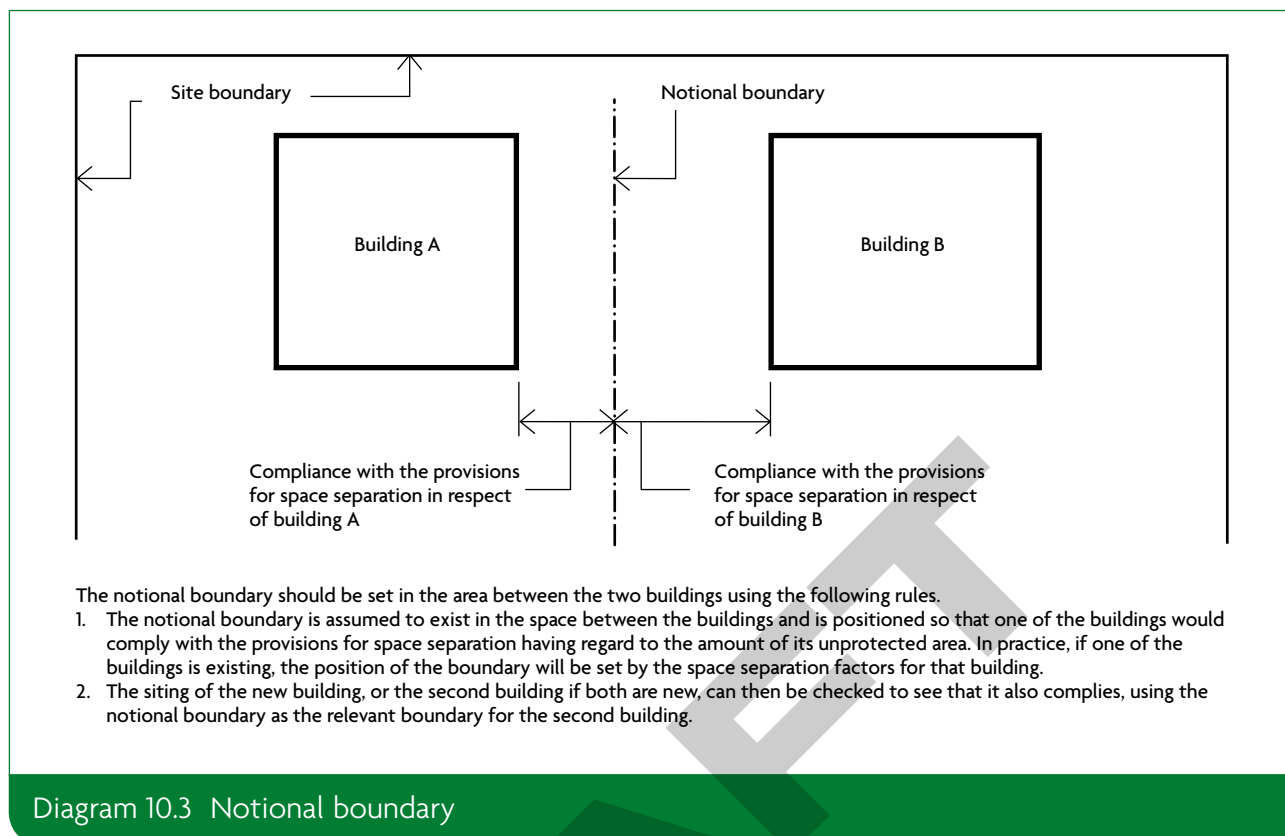


Diagram 10.2 Relevant boundary



## Unprotected areas and fire resistance

**10.5** Parts of an **external wall** with less fire resistance than the appropriate amount given in Appendix B, table B2, are called **unprotected areas**.

### External walls on, and within 1000mm of, the relevant boundary

**10.6** **Unprotected areas** should meet the conditions in diagram 10.4, and the rest of the wall should be **fire resisting** from both sides.

External surface materials facing the **boundary** should be class B-s3, d2 or better.

### External walls 1000mm or more from the relevant boundary

**10.7** **Unprotected areas** should not exceed the result given by one of the methods in paragraph 10.14, and the rest of the wall (if any) should be **fire resisting** but only from the inside of the **building**.

### External walls of protected shafts forming stairways

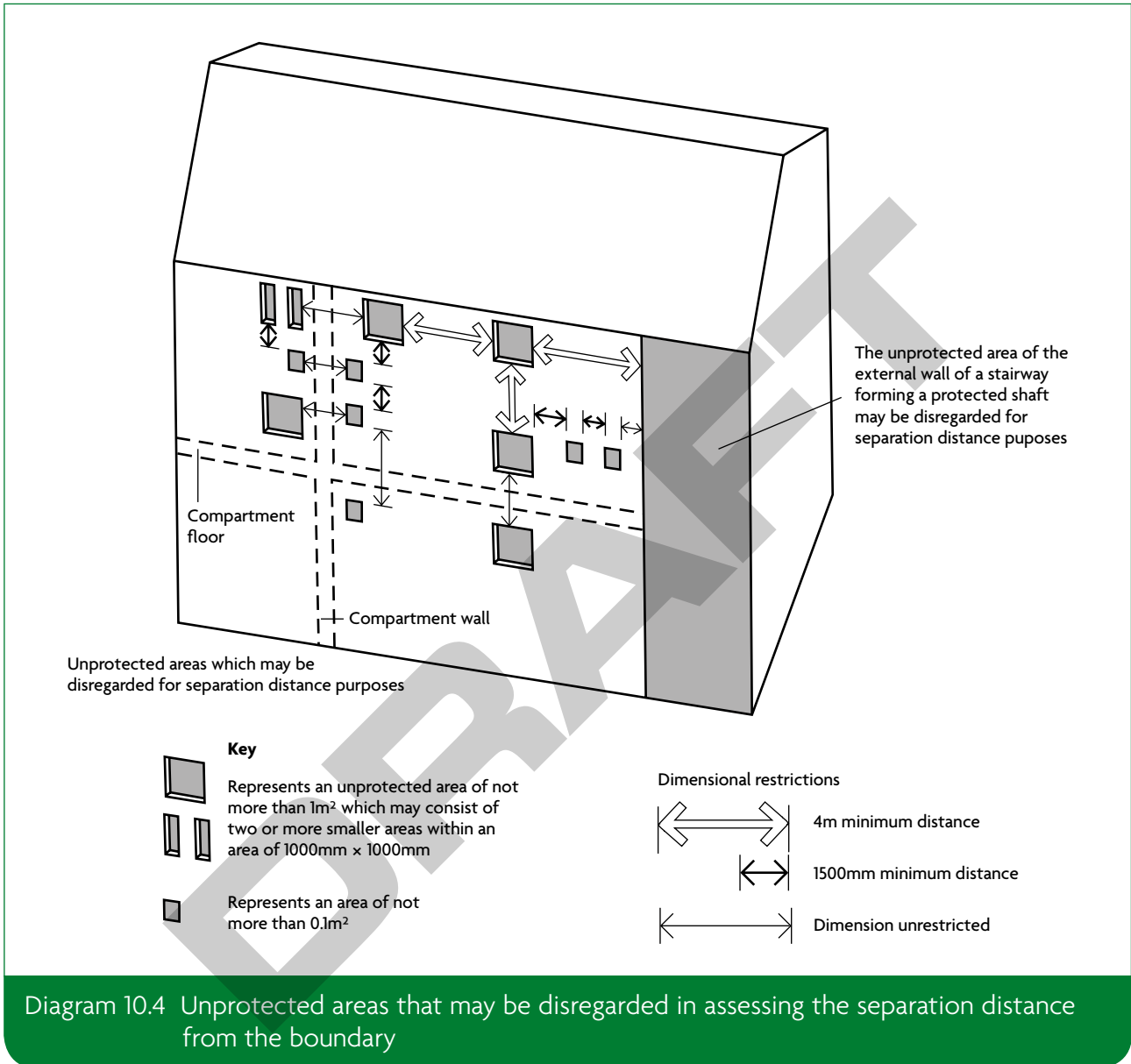
**10.8** Exclude **external walls** of stairs in **protected shafts** when assessing **unprotected areas** (see diagram 3.10).

### Small unprotected areas

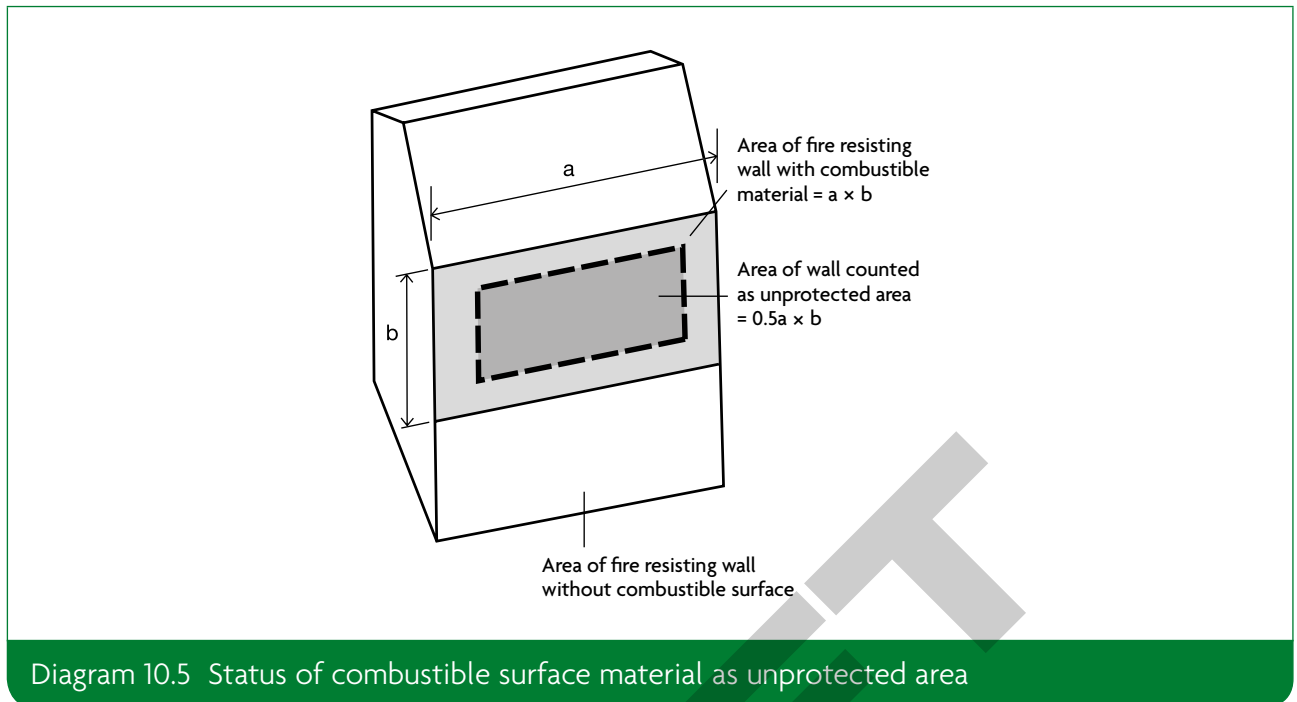
**10.9** In an otherwise protected wall, small **unprotected areas** may be ignored where they meet the conditions in diagram 10.4.

## Status of combustible surface materials as unprotected area

**10.10** Where a fire resisting external wall has a surface material that is class B-s3, d2 or worse and is more than 1mm thick, that part of the wall should be classified as an unprotected area equating to half its area (diagram 10.5).







## Canopies

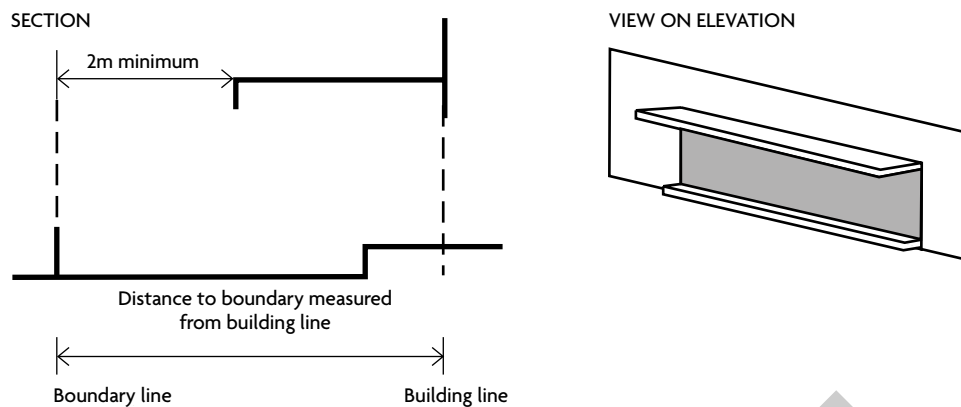
**10.11** Where both of the following apply, separation distances may be determined from the wall rather than from the edge of the canopy (diagram 10.6).

- a. The canopy is attached to the side of a **building**.
- b. The edges of the canopy are a minimum of 2m from the **relevant boundary**.

Canopies that fall within class 6 or class 7 of Schedule 2 to the Regulations (Exempt Buildings and Work) are exempt from the Building Regulations.

**10.12** Space separation may be disregarded if a canopy is all of the following.

- a. Free-standing.
- b. Above a limited risk or controlled hazard.
- c. A minimum of 1000mm from the **relevant boundary**.



Projections from the building line such as a canopy or a loading platform can be ignored when assessing separation distance. This would not apply to an enclosed loading bay, for example if the illustration had shown side walls beneath the canopy.

Diagram 10.6 The effect of a canopy on separation distance

## Roofs

**10.13** Roofs with a pitch which is more than 70 degrees to the horizontal should be assessed in accordance with this section. Vertical parts of a pitched roof, such as dormer windows, should be included *only* if the slope of the roof exceeds 70 degrees.

It is a matter of judgement whether a continuous run of dormer windows that occupies most of a steeply pitched roof should be treated as a wall rather than a roof.

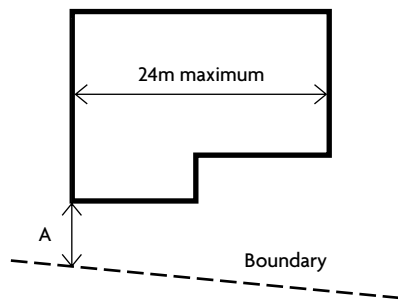
## Methods for calculating acceptable unprotected area

**10.14** Two simple methods are given for calculating the acceptable amount of **unprotected area** in an **external wall** that is a minimum of 1000mm from any point on the **relevant boundary**. More precise methods are described in BRE report BR 187, and may be used instead purposes.

### Method 1

**10.15** This method applies to small **buildings** intended to be used for blocks of **flats** or other residential (not institutional) purposes.

**10.16** The **building** should not exceed three **storeys** in **height** (excluding basements) or 24m in length. Each side of the **building** should meet the limits stated in diagram 10.7. Any areas falling within the limits shown in diagram 10.4 can be ignored.



Minimum distance (A) between side of building and relevant boundary (m)	Maximum total area of unprotected areas (m <sup>2</sup> )
1	5.6
2	12
3	18
4	24
5	30
6	No limit

Diagram 10.7 Permitted unprotected areas in small residential buildings

## Method 2

**10.17** This method may be used for buildings or compartments for which method 1 is not appropriate.

**10.18** The building should not exceed 10m in height. Each side of the building should meet the limits stated in table 10.1. Any areas falling within the limits shown in diagram 10.4 can be ignored.

**Table 10.1 Permitted unprotected areas in small buildings or compartments**

Minimum distance between side of building and relevant boundary (m)	Maximum total percentage of unprotected area % <sup>(1)</sup>
Not applicable	4
1	8
2.5	20
5	40
7.5	60
10	80
12.5	100

**NOTES:**

Intermediate values may be obtained if a distance is between two values in the table; the unprotected area may be estimated between the corresponding two values.

1. Found by dividing the total unprotected area by the area of a rectangle enclosing all the unprotected areas, and multiplying the result by 100.

## Sprinkler systems

**10.19** If a building is fitted throughout with a sprinkler system in accordance with paragraph 0.13, either of the following is permitted.

- The boundary distance can be halved, to a minimum distance of 1m.
- The amount of unprotected area can be doubled.

## Section 11: Resisting fire spread over external walls

This text is subject to a separate consultation “Banning the use of combustible materials in the external walls of high-rise residential buildings” – <http://www.gov.uk/government/consultations/banning-the-use-of-combustible-materials-in-the-external-walls-of-high-rise-residential-buildings>

**11.1** To reduce the risk of fire spreading over the external walls, Regulation [ ] prohibits the use of materials in or on the external walls that do not meet A2-s3, d2 or better where a building with a storey 18m or more above ground level contains a dwelling.

**NOTE:** Table B1 (Reaction to fire equivalence) is not relevant to Regulation [ ].

**NOTE:** Cavity barriers should be provided in accordance with section 8.

**NOTE:** The total amount of combustible material may also be limited on low-rise buildings to meet the need to resist fire spread from one building to another (see section 10).

## Section 12: Resisting fire spread over roof coverings

### Introduction

- 12.1** 'Roof covering' describes one or more layers of material, but not the roof structure as a whole.
- 12.2** Provisions for the fire properties of roofs are given in other parts of this document.
- Requirement B1 – for roofs that are part of a **means of escape**.
  - Requirement B2 – for the internal surfaces of **rooflights** as part of internal linings.
  - Requirement B3 – for roofs that are used as a floor and for roofs passing over a **compartment wall**.
  - Section 10 – the circumstances in which a roof is subject to the provisions for space separation.

### Separation distances

- 12.3** Separation distance is the minimum distance from the roof, or part of the roof, to the **relevant boundary** (paragraph 10.4). Table 12.1 sets out separation distances by the type of roof covering and the size and use of the **building**.

In addition, roof covering products (and/or materials) defined in Commission Decision 2000/553/EC of 6 September 2000, implementing Council Directive 89/106/EEC, can be considered to fulfil all of the requirements for the performance characteristic 'external fire performance' without the need for testing, *provided that any national provisions on the design and execution of works are fulfilled*, and can be used without restriction.

- 12.4** The performance of **rooflights** is specified in a similar way to the performance of roof coverings. Plastic **rooflights** may also be used.

### Plastic rooflights

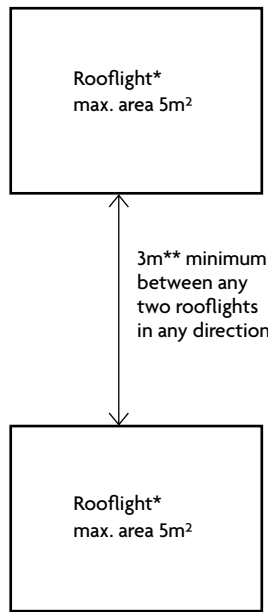
- 12.5** Table 12.2 sets the limitations for using plastic **rooflights** whose lower surface has a minimum class D-s3, d2 rating.
- 12.6** Table 12.3 and diagram 12.1 set the limitations for using **thermoplastic materials** with a TP(a) rigid or TP(b) classification. The method of classifying **thermoplastic materials** is given in Appendix B.
- 12.7** Other than for the purposes of diagram 5.2, polycarbonate or uPVC **rooflights** achieving a minimum of class C-s3, d2 rating can be regarded as having a  $B_{\text{ROOF}}(t4)$  classification.

### Unwired glass in rooflights

- 12.8** When used in **rooflights**, unwired glass a minimum of 4mm thick can be regarded as having a  $B_{\text{ROOF}}(t4)$  classification.

### Thatch and wood shingles

- 12.9** If the performance of thatch or wood shingles cannot be established, they should be regarded as having an  $E_{\text{ROOF}}(t4)$  classification in table 12.1.



\* Or group of rooflights amounting to no more than 5m<sup>2</sup>  
 \*\* Class D-s3, d2 rooflights to rooms in industrial and other non-residential purpose groups may be spaced 1800mm apart provided the rooflights are evenly distributed and do not exceed 20% of the area of the room

**NOTES:**

1. There are restrictions on the use of plastic rooflights in the guidance to requirement B2 in section 4.
2. Surrounding roof covering to be a material of limited combustibility for at least 3m distance.
3. Where diagram 5.2a or 5.2b applies, rooflights should be at least 1500mm from the compartment wall.

Diagram 12.1 Limitations on spacing and size of plastic rooflights that have a class D-s3, d2 or TP(b) lower surface

**Table 12.1 Limitations on roof coverings**

Designation† of covering of roof or part of roof	Distance from any point on relevant boundary			
	Less than 6m	At least 6m	At least 12m	At least 20m
B <sub>ROOF</sub> (t4)	●	●	●	●
C <sub>ROOF</sub> (t4)	○	●	●	●
D <sub>ROOF</sub> (t4)	○	● <sup>(1)(2)</sup>	● <sup>(1)</sup>	●
E <sub>ROOF</sub> (t4)	○	● <sup>(1)(2)</sup>	● <sup>(1)</sup>	● <sup>(1)</sup>
F <sub>ROOF</sub> (t4)	○	○	○	● <sup>(1)(2)</sup>

- Acceptable.
- Not acceptable.

**NOTES:**

Separation distances do not apply to the boundary between roofs of a pair of semi-detached houses and to enclosed/covered walkways. However, see diagram 5.2 if the roof passes over the top of a compartment wall.

Polycarbonate and uPVC rooflights that achieve a class 1 rating by test may be regarded as having a B<sub>ROOF</sub>(t4) designation.

Openable polycarbonate and uPVC rooflights that achieve a class C-s3, d2 rating by test may be regarded as having a B<sub>ROOF</sub>(t4) classification.

1. Not acceptable on any of the following buildings.
  - a. Houses in terraces of three or more houses.
  - b. Any other buildings with a cubic capacity of more than 1500m<sup>3</sup>.
2. Acceptable on buildings not listed in (1) if both of the following apply.
  - a. Part of the roof has a maximum area of 3m<sup>2</sup> and is a minimum of 1500mm from any similar part.
  - b. The roof between the parts is covered with a material rated class A2-s3, d2 or better.

**Table 12.2 Class D-s3, d2 plastic rooflights: Limitations on use and boundary distance**

Minimum classification on lower surface <sup>(1)</sup>	Space which rooflight can serve	Minimum distance from any point on relevant boundary to rooflight with an external designation* of:	
		$E_{ROOF}(t4)$ or $D_{ROOF}(t4)$	$F_{ROOF}(t4)$
Class D-s3, d2	a. Balcony, verandah, carport, covered way or loading bay with at least one longer side wholly or permanently open b. Detached swimming pool c. Conservatory, garage or outbuilding, with maximum floor area of 40m <sup>2</sup>	6m	20m
	d. Circulation space <sup>(2)</sup> (except a protected stairway) e. Room <sup>(2)</sup>	6m <sup>(3)</sup>	20m <sup>(3)</sup>

**NOTES:**

\* The designation of external roof surfaces is explained in Appendix B.

None of the above designations are suitable for protected stairways.

Polycarbonate and uPVC rooflights that achieve a class C-s3, d2 rating by test (paragraph 12.7) may be regarded as having a  $B_{ROOF}(t4)$  classification.

Where diagram 5.2a or 5.2b applies, rooflights should be a minimum of 1500mm from the compartment wall.

If double-skinned or laminate products have upper and lower surfaces of different materials, the greater distance applies.

1. See also the guidance to requirement B2 in section 4.
2. Single-skinned rooflight only, in the case of non-thermoplastic material.
3. The rooflight should also meet the provisions of diagram 12.1.

**Table 12.3 TP(a) and TP(b) plastic rooflights: Limitations on use and boundary distance**

Minimum classification on lower surface <sup>(1)</sup>	Space which rooflight can serve	Minimum distance from any point on relevant boundary to rooflight with an external designation <sup>(1)</sup> of:	
		TP(a)	TP(b)
1. TP(a) rigid	Any space except a protected stairway	6m <sup>(2)</sup>	Not applicable
2. TP(b)	a. Balcony, verandah, carport, covered way or loading bay that has at least one longer side wholly or permanently open	Not applicable	6m
	b. Detached swimming pool		
	c. Conservatory, garage or outbuilding, with a maximum floor area of 40m <sup>2</sup>		
	d. Circulation space <sup>(3)</sup> (except a protected stairway)	Not applicable	6m <sup>(4)</sup>
	e. Room <sup>(3)</sup>		

**NOTES:**

None of the above designations are suitable for protected stairways.

Polycarbonate and uPVC rooflights that achieve a class C-s3, d2 rating by test (paragraph 12.7) may be regarded as having a B<sub>ROOF</sub>(t4) classification.

Where diagram 5.2a or 5.2b applies, rooflights should be a minimum of 1500mm from the compartment wall.

If double-skinned or laminate products have upper and lower surfaces of different materials, the greater distance applies.

1. See also the guidance to requirement B2 in section 4.

2. No limit in the case of any space described in 2a, b and c.

3. Single-skinned rooflight only, in the case of non-thermoplastic material.

4. The rooflight should also meet the provisions of diagram 12.1.



# Requirement B5: Access and facilities for the fire service

These sections deal with the following requirement from Part B of Schedule 1 to the Building Regulations 2010.

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

## Intention

Provisions covering access and facilities for the fire service are to safeguard the health and safety of people in and around the **building**. Their extent depends on the size and use of the **building**. Most firefighting is carried out within the **building**. In the Secretary of State's view, requirement B5 is met by achieving all of the following.

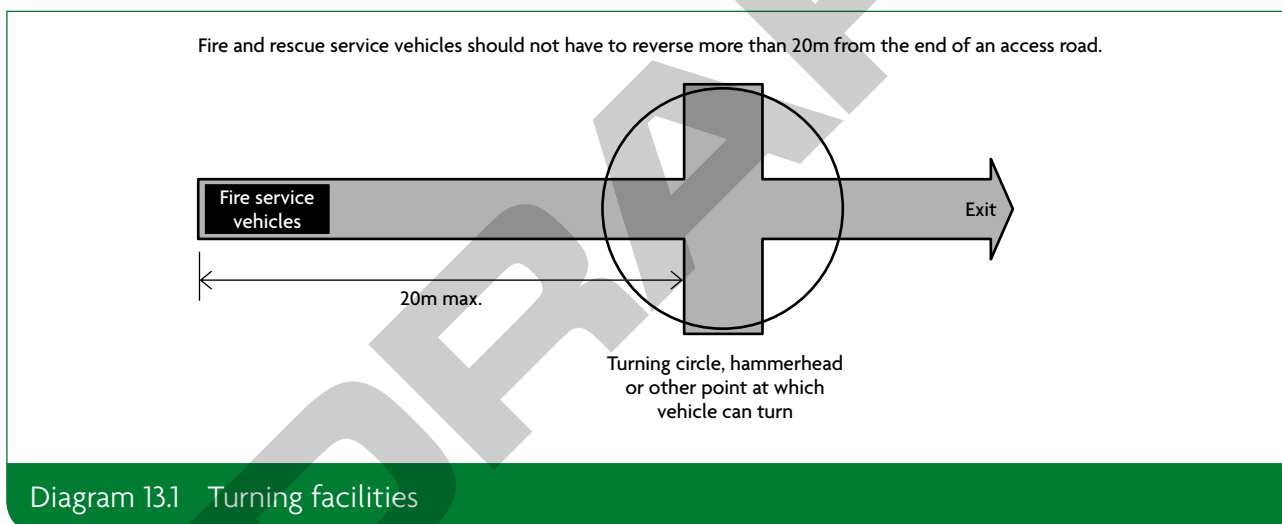
- a. External access enabling fire appliances to be used near the **building**.
- b. Access into and within the **building** for firefighting personnel to both:
  - i. search for and rescue people
  - ii. fight fire.
- c. Provision of internal fire mains and other facilities for firefighters to complete their tasks.

Where deviating from the general guidance, it is advisable to seek advice from the fire and rescue service as early as possible (even if there is no statutory duty to consult). If an alternative approach is taken to providing the **means of escape**, outside the scope of this approved document, additional provisions for firefighting access may be required.

## Section 13: Vehicle access

### Provision and design of access routes and hardstandings

- 13.1 For houses, access for a pumping appliance should be provided to within 45m of all points inside the house.
- 13.2 For flats, either of the following provisions should be made.
  - a. Access for a pumping appliance to within 45m of all points inside each flat of a block, measured along the route of the hose.
  - b. Provide fire mains in accordance with paragraphs 13.5 and 13.6.
- 13.3 Access routes and hardstandings should meet the guidance in table 13.1.
- 13.4 Dead-end access routes longer than 20m require turning facilities, as in diagram 13.1. Turning facilities should meet the guidance in table 13.1.



**Table 13.1 Typical fire and rescue 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 reach	3.7	3.1	26.0	29.0	4.0	17.0

**NOTES:**

1. Fire appliances are not standardised. The building control body may, in consultation with the local fire and rescue service, use other dimensions.
2. The roadbase can be designed to 12.5 tonne capacity. Structures such as bridges should have the full 17-tonne capacity. The weight of high reach appliances is distributed over a number of axles, so infrequent use of a route designed to accommodate 12.5 tonnes should not cause damage.

## Blocks of flats fitted with fire mains

- 13.5** For buildings fitted with dry fire mains, both of the following apply.
- Access should be provided for a pumping appliance to within 18m of each fire main inlet connection point. Inlets should be on the face of the building.
  - The fire main inlet connection point should be visible from the parking position of the appliance.
- 13.6** For buildings fitted with wet mains, access for a pumping appliance should comply with both of the following.
- Within 18m, and within sight, of an entrance giving access to the fire main.
  - Within sight of the inlet to replenish the suction tank for the fire main in an emergency.

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## Section 14: Fire mains and hydrants – flats

### Introduction

**14.1** Fire mains are installed for the fire and rescue service to connect hoses for water. They may be either of the following.

- a. The 'dry' type, which are both of the following.
  - i. Normally kept empty.
  - ii. Supplied through a hose from a fire and rescue service pumping appliance.
- b. The 'wet' type, which are both of the following.
  - i. Kept full of water.
  - ii. Supplied by pumps from tanks in the building.

There should be a facility to replenish a wet system from a pumping appliance in an emergency.

### Provision of fire mains

**14.2** Buildings with firefighting shafts should have fire mains in both of the following.

- a. The firefighting shafts.
- b. Where necessary, in protected escape stairs.

The criteria for providing firefighting shafts and fire mains are given in section 15.

**14.3** Buildings without firefighting shafts may be provided with fire mains where vehicle access is not provided in accordance with table 13.1.

In these cases, outlets from fire mains should be located as described in paragraphs 13.5 and 13.6, and stairs do not need to be designed as firefighting shafts.

### Design and construction of fire mains

**14.4** If a firefighting shaft is provided, outlets from fire mains should be within the protected stairway (see diagram 15.2).

**14.5** Buildings with a storey more than 50m above vehicle access level should be provided with wet fire mains.

**14.6** Guidance on other aspects of fire mains design and construction is given in **BS 9990**.

### Provision of private hydrants

**14.7** A building requires additional fire hydrants if both of the following apply.

- a. It has a compartment with an area of more than 280m<sup>2</sup>.
- b. It is being erected more than 100m from an existing fire hydrant.

- 14.8** Additional hydrants should be provided in accordance with the following.
- a. For **buildings** provided with fire mains – within 90m of dry fire main inlets.
  - b. For **buildings** not provided with fire mains – hydrants should be both of the following.
    - i. Within 90m of an entrance to the **building**.
    - ii. A maximum of 90m apart.
- 14.9** Each fire hydrant should be clearly indicated by a plate, fixed nearby in a conspicuous position, in accordance with **BS 3251**.
- 14.10** An alternative source of water should be supplied where any of the following apply.
- a. No piped water supply is available.
  - b. Pressure and flow in the water main are insufficient.
  - c. An alternative source of supply is proposed.
- The alternative source of water supply should be one of the following.
- a. A charged static water tank with a minimum capacity of 45,000 litres.
  - b. A spring, river, canal or pond that is capable of fulfilling both of the following conditions.
    - i. Providing or storing a minimum of 45,000 litres of water at all times.
    - ii. Providing access, space and a hardstanding for a pumping appliance.
  - c. Any other water supply that the local fire and rescue service considers appropriate.

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## Section 15: Access to buildings for firefighting personnel – flats

### Provision of firefighting shafts

- 15.1** Compartmentation in blocks of flats imposes specific constraints for firefighting shafts. In low-rise buildings without deep basements, access for firefighting personnel is typically met by providing normal measures for vehicle access and means of escape.
- 15.2** Firefighting shafts should achieve a minimum fire resistance of REI 120. A minimum of REI 60 is acceptable for either of the following.
- Constructions separating the shaft from the rest of the building.
  - Constructions separating the firefighting stair, firefighting lift shaft and firefighting lobby.
- 15.3** A building with a storey more than 18m above the fire and rescue service vehicle access level should have firefighting shafts containing firefighting lifts. Shafts are not required to serve a basement that is not large or deep enough to need one (see paragraph 15.4 and diagram 15.1).
- 15.4** A building with basement storeys should have firefighting shafts in accordance with the following.
- There is a basement more than 10m below the fire and rescue service vehicle access level. The firefighting shafts should contain firefighting lifts.
  - There are two or more basement storeys, each with a minimum area of 900m<sup>2</sup>. The firefighting shafts do not need to include firefighting lifts.
- The building's height and size determines whether shafts also serve upper storeys.
- 15.5** Firefighting shafts should serve all storeys through which they pass (see diagram 15.1).
- 15.6** A minimum of two firefighting shafts should be provided to buildings with a storey that has both of the following.
- A floor area of 900m<sup>2</sup> or more.
  - Its floor level 18m or more above the fire and rescue service vehicle access level.

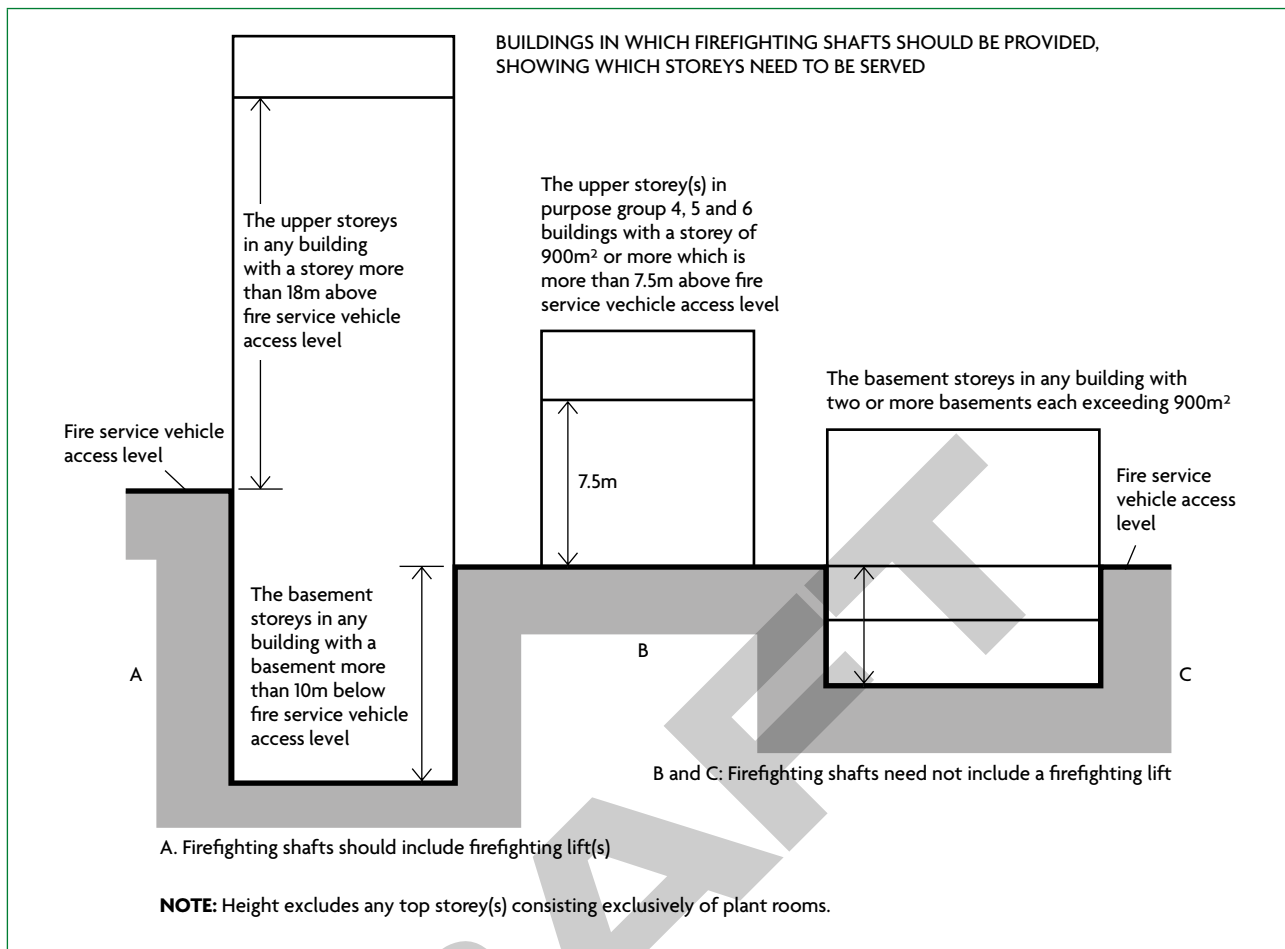
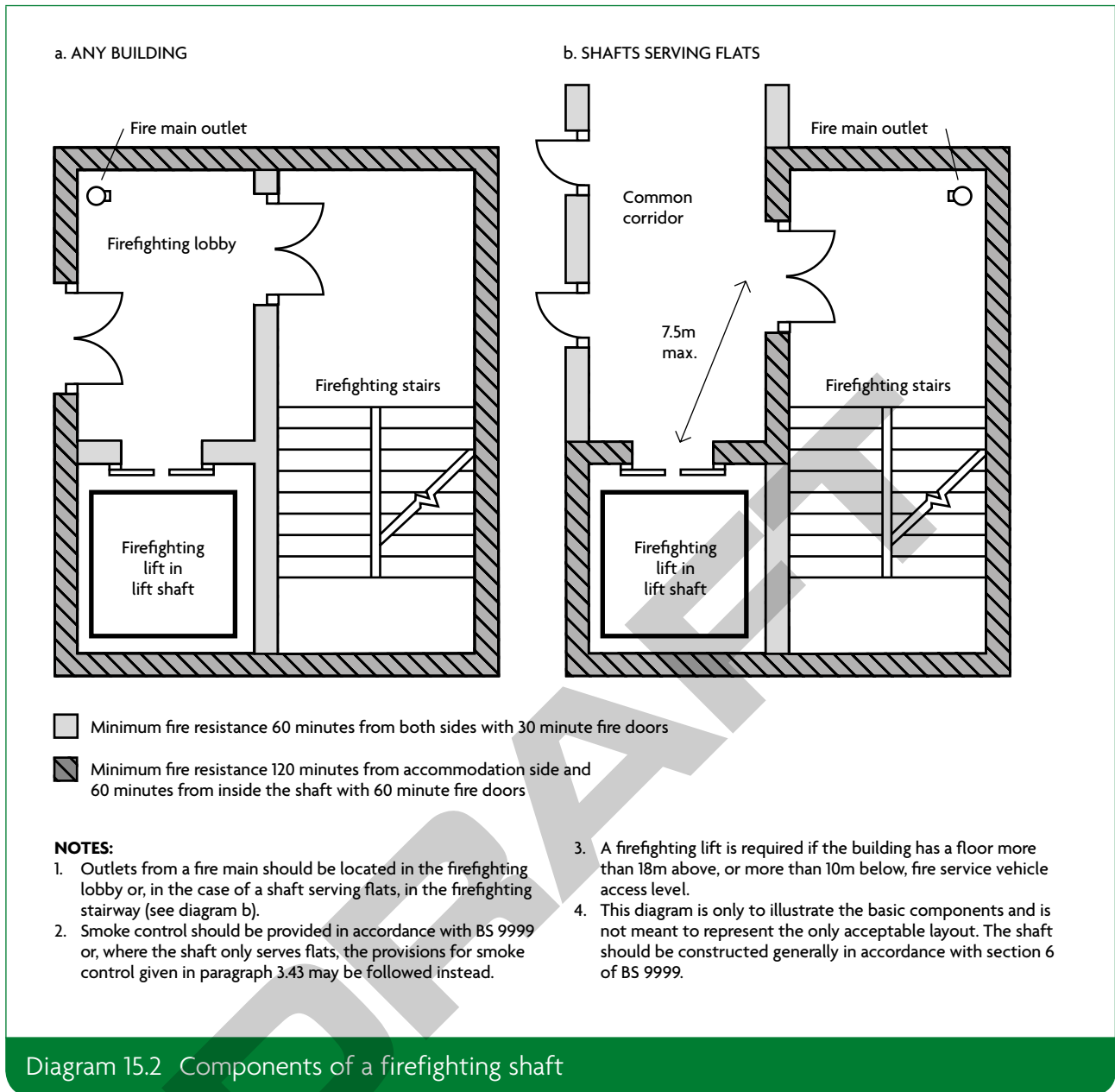


Diagram 15.1 Provision of firefighting shafts



## Location of firefighting shafts

**15.7** Locations should comply with the following maximum distances. Distances should be measured on a route suitable for laying a hose to every part of each storey more than 18m above the fire and rescue service vehicle access level.

- a. If the building is fitted throughout with an automatic sprinkler system in accordance with paragraph 0.13, a maximum of 60m from a fire main outlet in a firefighting shaft.
- b. If the building is not fitted throughout with an automatic sprinkler system, either of the following.
  - i. A maximum of 45m from a fire main outlet in a protected stairway (additional fire mains may need to be provided in escape stairs, which do not need to be firefighting shafts).
  - ii. A maximum of 60m from a fire main outlet in a firefighting shaft.



## Design and construction of firefighting shafts

**15.8** Firefighting stairs and lifts should be approached from either of the following.

- a. A firefighting lobby.
- b. A protected corridor or protected lobby that complies with the following guidance.
  - i. Means of escape (section 3).
  - ii. Compartmentation (section 7).

Both the stair and lobby of the firefighting shaft should be provided with a means of venting smoke and heat (see clause 27.1 of **BS 9999**).

Only services associated with the firefighting shaft, such as ventilation systems and lighting for the shaft, should pass through or be contained within the firefighting shaft.

Doors of a firefighting lift landing should be a maximum of 7.5m from the door to the firefighting stair (diagram 15.2).

**15.9** All firefighting shafts should have fire mains with outlet connections and valves at every storey.

**15.10** A firefighting lift installation includes all of the following.

- a. Lift car.
- b. Lift well.
- c. Lift machinery space.
- d. Lift control system.
- e. Lift communications system.

The lift shaft should be constructed in accordance with section 6 of **BS 9999**.

Firefighting lift installations should conform to **BS EN 81-72** and **BS EN 81-20**.

## Rolling shutters in compartment walls

**15.11** The fire and rescue service should be able to manually open and close rolling shutters without the use of a ladder.

## Regulation 38: Fire safety information

This section deals with the following regulation of the Building Regulations 2010.

### Fire safety information

**38.** (1) This regulation applies where building work:

- (a) consists of or includes the erection or extension of a relevant building; or
- (b) is carried out in connection with a relevant change of use of a building, and Part B of Schedule 1 imposes a requirement in relation to the work.

(2) The person carrying out the work shall give fire safety information to the responsible person not later than the date of completion of the work, or the date of occupation of the building or extension, whichever is the earlier.

(3) In this regulation:

- (a) 'fire safety information' means information relating to the design and construction of the building or extension, and the services, fittings and equipment provided in or in connection with the building or extension which will assist the responsible person to operate and maintain the building or extension with reasonable safety;
- (b) a 'relevant building' is a building to which the Regulatory Reform (Fire Safety) Order 2005 applies, or will apply after the completion of building work;
- (c) a 'relevant change of use' is a material change of use where, after the change of use takes place, the Regulatory Reform (Fire Safety) Order 2005 will apply, or continue to apply, to the building; and
- (d) 'responsible person' has the meaning given by article 3 of the Regulatory Reform (Fire Safety) Order 2005.

## Section 16: Fire safety information

- 16.1** For building work involving the erection or extension of a relevant **building**, or the relevant change of use of a **building**, fire safety information should be given to the responsible person at one of the following times.
- When the project is complete.
  - When the **building** or extension is first occupied.
- 16.2** This section is a guide to the information that should be provided. Guidance is in terms of simple and complex **buildings**. The level of detail required should be considered on a case-by-case basis.

### Simple buildings

- 16.3** Basic information on the location of fire protection measures may be sufficient. An as-built plan of the **building** should be provided showing all of the following.
- Escape routes**.
  - Location of **fire-separating elements** (including **cavity barriers** in walk-in spaces).
  - Fire doorsets**, **fire doorsets** fitted with a **self-closing device** and other doors equipped with relevant hardware.
  - Locations of fire and/or smoke detector heads, alarm call points, detection/alarm control boxes, alarm sounders, fire safety signage, **emergency lighting**, fire extinguishers, dry or wet fire mains and other firefighting equipment, and hydrants outside the **building**.
  - Any sprinkler systems, including isolating valves and control equipment.
  - Any smoke control systems, or ventilation system with a smoke control function, including mode of operation and control systems.
  - Any high risk areas (e.g. heating machinery).
- 16.4** Details should be provided of all of the following.
- Specifications of fire safety equipment provided, including routine maintenance schedules.
  - Any assumptions regarding the management of the **building** in the design of the fire safety arrangements.
  - Any provision enabling the evacuation of disabled people, which can be used when designing personal emergency evacuation plans.

### Complex buildings

- 16.5** A detailed record should be provided of both of the following.
- The fire safety strategy.
  - Procedures for operating and maintaining any fire protection measures.

Further guidance is available in **BS 9999-17** clause 9 and Annex H.

- 16.6** The records should include details of all of the following.
- a. The fire safety strategy, including all assumptions in the design of the fire safety systems (such as fire load). Any risk assessments or risk analysis.
  - b. All assumptions in the design of the fire safety arrangements for the management of the building.
  - c. All of the following.
    - i. Escape routes.
    - ii. Escape strategy (e.g. simultaneous or phased).
    - iii. Muster points.
  - d. All passive fire safety measures, including all of the following.
    - i. Compartmentation (i.e. location of fire-separating elements).
    - ii. Cavity barriers.
    - iii. Fire doorsets.
    - iv. Fire doorsets fitted with a self-closing device and other doors equipped with relevant hardware (e.g. electronic security locks).
    - v. Duct dampers.
    - vi. Fire shutters.
  - e. All of the following.
    - i. Fire detector heads.
    - ii. Smoke detector heads.
    - iii. Alarm call points.
    - iv. Detection/alarm control boxes.
    - v. Alarm sounders.
    - vi. Emergency communications systems.
    - vii. CCTV.
    - viii. Fire safety signage.
    - ix. Emergency lighting.
    - x. Fire extinguishers.
    - xi. Dry or wet fire mains and other firefighting equipment.
    - xii. Other interior facilities for the fire and rescue service.
    - xiii. Emergency control rooms.
    - xiv. Location of hydrants outside the building.
    - xv. Other exterior facilities for the fire and rescue service.

- f. All active fire safety measures, including both of the following.
- i. Sprinkler system(s) design, including isolating valves and control equipment.
  - ii. Smoke control system(s) (or heating, ventilation and air conditioning system with a smoke control function) design, including mode of operation and control systems.
- g. Any high risk areas (e.g. heating machinery) and particular hazards.
- h. Plans of the **building** as built, showing the locations of the above.
- i. Both of the following.
- i. Specifications of any fire safety equipment provided, including all of the following.
    - Operational details.
    - Operators' manuals.
    - Software.
    - System zoning.
    - Routine inspection, testing and maintenance schedules.
  - ii. Records of any acceptance or commissioning tests.
- j. Any provision to enable the evacuation of disabled people.
- k. Any other details appropriate for the specific **building**.

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## Appendix A: Key terms

**NOTE:** Except for the items marked \* (which are from the Building Regulations 2010), these definitions apply only to Approved Document B.

**NOTE:** The terms defined below are key terms used in this document only. Refer to BS 4422 for further guidance on the definitions of common terms used in the fire safety industry which are not listed below.

**Access room** A room that the only escape route from an inner room passes through.

**Alternative escape routes** Escape routes that are sufficiently separated by direction and space or by fire resisting construction to ensure that one is still available if the other is affected by fire.

**Alternative exit** One of two or more exits, each of which is separate from the other.

**Automatic release mechanism** A device that normally holds a door open, but closes it automatically if any one of the following occurs.

- Smoke is detected by automatic apparatus of a suitable nature and quality in a suitable location.
- A hand-operated switch, fitted in a suitable position, is operated.
- The electricity supply to the device, apparatus or switch fails.
- The fire alarm system, if any, is operated.

**Basement storey** A storey with a floor that, at some point, is more than 1200mm below the highest level of ground beside the outside walls. (However, see Appendix B, table B3, for situations where the storey is considered to be a basement only because of a sloping site.)

**Boundary** The boundary of the land that belongs to a building, or, where the land abuts a road, railway, canal or river, the centre line of that road, railway, canal or river.

**\*Building** Any permanent or temporary building but not any other kind of structure or erection. A reference to a building includes a reference to part of a building.

**Building control body** A term that includes both local authority building control and approved inspectors.

**Cavity barrier** A construction other than a smoke curtain, to perform either of the following functions.

- Close a concealed space to stop smoke or flame entering.
- Restrict the movement of smoke or flame within a concealed space.

**Ceiling** Part of a building that encloses a room, protected shaft or circulation space and is exposed overhead.

**NOTE:** The soffit of a rooflight, but not the frame, is included as part of the surface of the ceiling. An upstand below a rooflight is considered as a wall.

**Circulation space** A space (including a protected stairway) mainly used as a means of access between a room and an exit from the building or compartment.

**Class 0** A product performance classification for wall and ceiling linings. The relevant test criteria are set out in Appendix B, table B1.

**Common balcony** A walkway, open to the air on one or more sides, that forms part of the escape route from more than one flat.

**Common stair** An escape stair that serves more than one flat.

**Compartment (fire)** A building or part of a building, comprising one or more rooms, spaces or storeys, that is constructed to prevent the spread of fire to or from another part of the same building or an adjoining building.

**NOTE:** A roof space above the top storey of a compartment is included in that compartment. (See also 'Separated part'.)

**Compartment wall or floor** A fire resisting wall or floor to separate one fire compartment from another.

**NOTE:** Provisions relating to construction are given in section 7.

**Concealed space or cavity** A space enclosed by elements of a building (including a suspended ceiling) or contained within an element, but that *is not* a room, cupboard, circulation space, protected shaft, or space within a flue, chute, duct, pipe or conduit.

**Corridor access** A design of a building containing flats, in which each flat is approached via a common horizontal internal access or circulation space, which may include a common entrance hall.

**Dead end** An area from which escape is possible in one direction only.

**Dwelling** A unit where one or more people live (whether or not as a sole or main residence) in either of the following situations.

- A single person or by people living together as a family.
- A maximum of six people living together as a single household, including where care is provided for residents.

**Element of structure** Any of the following.

- A member that forms part of the structural frame of a building, or any other beam or column.
- A loadbearing wall or loadbearing part of a wall.
- A floor.

- A gallery (but *not* a loading gallery, fly gallery, stage grid, lighting bridge or any gallery provided for similar purposes or for maintenance and repair).
- An external wall.
- A compartment wall (including a wall that is common to two or more buildings).

**NOTE:** However, see the guidance to requirement B3, paragraph 6.2, for a list of structures that are *not* considered to be elements of structure.

**Emergency lighting** Lighting for use when the power supply to the normal lighting fails.

**Escape lighting** The part of the emergency lighting that is provided to ensure that the escape route is illuminated at all material times.

**Escape route** The route along which people can escape from any point in a building to a final exit.

**Evacuation lift** A lift that may be used to evacuate people in a fire.

**Exit passageway** A protected passageway that connects a protected stairway to a final exit.

**NOTE:** Exit passageways should be protected to the same standard as the stairway they serve.

**External wall** The external wall of a building includes a part of a roof pitched at more than 70 degrees to the horizontal if that part of the roof is beside a space within the building to which people have access (but *not* access only for repair or maintenance).

**Final exit** The end of an escape route from a building that gives direct access to a street, passageway, walkway or open space, and is sited to ensure that people rapidly disperse away from the building so that they are no longer in danger from fire and/or smoke.

**NOTE:** Windows are not acceptable as final exits.

**Fire alarm system** Combination of components for giving an audible and/or other perceptible alarm of fire.

**Fire damper** A mechanical or intumescent device within a duct or ventilation opening that operates automatically and is designed to prevent the spread of fire. A fire damper should achieve an integrity E classification and/or an ES classification to **BS EN 13501-3** when tested to **BS EN 1366-2**. Intumescent fire dampers may be tested to **BS ISO 10294-5**.

**Fire and smoke damper** A fire damper which, when tested to **BS EN 1366-2**, both:

- meets the ES classification requirements in **BS EN 13501-3**
- achieves the same fire resistance in relation to integrity as the element of the building through which the duct passes.

Intumescent fire dampers may be tested to **BS ISO 10294-2**.

**Fire doorset** A door or shutter which, together with its frame and furniture as installed in a building, is intended (when closed) to resist the spread of fire and/or gaseous products of combustion and meets specified performance criteria to those ends.

**NOTE:** A fire doorset may have one or more leaves. The term includes a cover or other form of protection to an opening in a fire resisting wall or floor, or in a structure that surrounds a protected shaft.

**Firefighting lift** A lift with additional protection and with controls that enable it to be used by the fire and rescue service when fighting a fire. (See section 15.)

**Firefighting lobby** A protected lobby that provides access from a firefighting stair to the accommodation area and to any associated firefighting lift.

**Firefighting shaft** A protected enclosure that contains a firefighting stair, firefighting lobbies and, if provided, a firefighting lift together with its machine room.

**Firefighting stair** A protected stairway that connects to the accommodation area through only a firefighting lobby.

**Fire resisting (fire resistance)** The ability of a component or a building to satisfy, for a stated period of time, some or all of the appropriate criteria given in the relevant standard.

**Fire-separating element** A compartment wall, compartment floor, cavity barrier and construction that encloses a protected escape route and/or a special fire hazard.

**Fire-stop** A seal provided to close an imperfection of fit or design tolerance between elements or components, to restrict the spread of fire and smoke.

**\*Flat** A separate and self-contained premises constructed or adapted for residential purposes that forms part of a larger building. Each flat is divided horizontally from some part of the building as a whole.

**Gallery** A floor or balcony that does not extend across the full extent of a building's footprint and is open to the floor below.

**Habitable room** A room used, or intended to be used, for people to live in (including, for the purposes of Approved Document B Volume 1 and 2, a kitchen, but not a bathroom).

**Height** (of a building or storey for the purposes of Approved Document B Volume 1 and 2)

- Height of a building is measured as shown in Appendix D, diagram D4.
- Height of the floor of the top storey above ground level is measured as shown in Appendix D, diagram D6.

**Inner room** Room from which escape is possible only by passing through another room (the access room).

**Live/work unit** A flat that is a workplace for people who live there, its occupants and for people who do not live on the premises.



**Material of limited combustibility** A material that meets the performance specification for which the test criteria are set out in Appendix B, table B1. Materials of limited combustibility include non-combustible materials.

**Means of escape** Structural means that provide one or more safe routes for people to go, during a fire, from any point in the building to a place of safety.

#### Measurement

- Width of a doorway, cubic capacity, area, height of a building and number of storeys are measured as shown in Appendix D, diagrams D1 to D7.
- Occupant capacity, travel distance, escape route and stairs are measured as described in Appendix D.

**Notional boundary** A boundary presumed to exist between two buildings on the same site.

**Pipe** Includes pipe fittings and accessories. The definition of 'pipe' *excludes* a flue pipe and a pipe used for ventilating purposes, other than a ventilating pipe for an above ground drainage system).

**Place of special fire hazard** A room such as any of the following.

- Oil-filled transformer room.
- Switch gear room.
- Boiler room.
- Storage space for fuel or other highly flammable substance(s).
- Room that houses a fixed internal combustion engine.

**Platform floor** (also called an access or raised floor) A floor that is supported by a structural floor, but with an intervening concealed space to house services.

**Protected circuit** An electrical circuit that is protected against fire.

**Protected corridor/lobby** A corridor or lobby that is adequately protected from fire in adjoining areas by fire resisting construction.

**Protected entrance hall/landing** A circulation area, consisting of a hall or space in a flat, that is enclosed with fire resisting construction other than an external wall of a building.

**Protected shaft** A shaft that enables people, air or objects to pass from one compartment to another, and which is enclosed with fire resisting construction.

**Protected stairway** A stair that leads to a final exit to a place of safety and that is adequately enclosed with fire resisting construction. Included in the definition is any exit passageway between the foot of the stair and the final exit.

**Purpose group** A classification of a building according to the purpose to which it is intended to be put. (See table 0.1.)

**Relevant boundary** The boundary or notional boundary that one side of the building faces and/or coincides with, and that is parallel or at an angle of a maximum of 80 degrees to that side of the building.

**Rooflight** A dome light, lantern light, skylight, ridge light, glazed barrel vault or other element to admit daylight through a roof.

**Room** An enclosed space within a building that is not used solely as a circulation space. The term includes not only conventional rooms, but also cupboards that are not fittings and large spaces such as warehouses and auditoria. The term *does not* include voids such as ducts, ceiling voids and roof spaces.

**Self-closing device** A device that closes a door, when open at any angle, against a door frame.

**NOTE:** If the door is in a cavity barrier, rising butt hinges (which are different from the self-closing device mentioned above) are acceptable.

**Separated part** (of a building) Part of a building that is separated from another part of the same building by a compartment wall. The wall runs the full height of the part and is in one vertical plane. (See Appendix D, diagram D5.)

**Sheltered housing** Includes two or more dwellings in the same building or on adjacent sites, designed and constructed as residential accommodation for vulnerable or elderly people who receive, or will receive, a support service.

**Single storey building** A building that consists of a ground storey only. Basements are not counted as storeys in a building (see Appendix D). A separated part that consists of a ground storey only, with a roof to which access is only provided for repair or maintenance, may be treated as a single storey building.

**Site** (of a building) The land occupied by the building, up to the boundaries with land in other ownership.

**Storey** Includes any of the following.

- Any gallery in an assembly building (purpose group 5).
- Any gallery in any other type of building if its area is more than half that of the space into which it projects.
- A roof, unless it is accessible only for maintenance and repair.

**NOTE:** The building is regarded as a multi-storey building if both of the following apply.

- There is more than one gallery.
- The total aggregate area of all the galleries in one space is more than half the area of that space.

**Storey exit** A final exit, or a doorway that gives direct access into a protected stairway, firefighting lobby or external escape route.

**NOTE:** If an institutional building is planned to enable progressive horizontal evacuation, a door in a compartment wall is considered a storey exit for the purposes of requirement B1.

**Suspended ceiling** (fire-protecting) A ceiling suspended below a floor that adds to the fire resistance of the floor.

**Thermoplastic material** Any synthetic polymeric material that has a softening point below 200°C if tested to **BS EN ISO 306** Method A120. Specimens for this test may be fabricated from the original polymer where the thickness of material of the end product is less than 2.5mm.

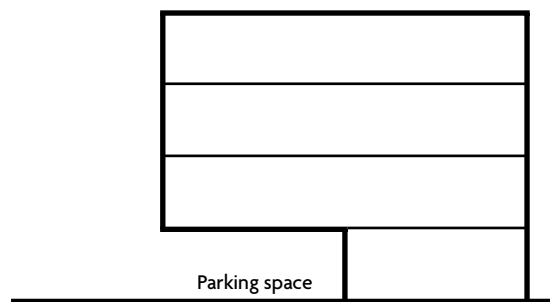
**Travel distance** (unless otherwise specified, e.g. as in the case of flats) The distance that a person would travel from any point within the floor area to the nearest storey exit, in view of the layout of walls, partitions and fittings.

**Unprotected area** (in relation to a side or external wall of a building) All of the following are classed as unprotected areas.

- Windows, doors or other openings.

**NOTE:** Neither of the following should be regarded as unprotected areas.

- Windows that are not openable and are designed and glazed to give the necessary level of fire resistance.
- Recessed car parking areas as shown in diagram A1.
- Any part of the external wall that has less than the relevant fire resistance set out in section 10.
- Any part of the external wall to the external face of which combustible material more than 1mm thick is attached or applied, whether for cladding or any other purpose. Combustible material in this context is any material which does not have a class B-s3, d2 rating.



**NOTE:** The parking area should be both of the following.

- Open fronted.
- Separated from the remainder of the building by a compartment wall(s) and floor(s) having not less than the period of fire resistance specified in table B3 in Appendix B.

Diagram A1 Recessed car parking areas

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# Appendix B: Performance of materials, products and structures

This text is subject to a separate consultation “Amendments to statutory guidance on assessments in lieu of test in Approved Document B (Fire Safety)” – [www.gov.uk/government/consultations/approved-document-b-fire-safety-amendments-to-statutory-guidance-on-assessments-in-lieu-of-tests](http://www.gov.uk/government/consultations/approved-document-b-fire-safety-amendments-to-statutory-guidance-on-assessments-in-lieu-of-tests)

## Introduction

- B1** Much of the guidance in this document is given in terms of performance classifications in relation to British or European Standards. In such cases the performance of products and systems should be demonstrated using one of the following methods.
- They should be in accordance with a specification or design that has been shown by a specific test to be capable of meeting that performance classification.
  - They should have been assessed by applying relevant test evidence, in lieu of carrying out a specific test, as being capable of meeting that performance classification.
  - They should have been designed by using relevant design standards in order to meet that performance classification.
- B2** Any test evidence used to demonstrate the fire performance classification of a product or system should be carefully checked to ensure that it is applicable to the intended use. Small differences in detail, such as fixing method, joints, dimensions, the introduction of insulation materials and air gaps (ventilated or not), can significantly affect the performance.
- B3** Where it is proposed to assess the classification of a product or system in lieu of carrying out a specific test (as in B1b above), this should be done in accordance with the relevant standard for extended application for the test in question.

For performance classifications where there is no specific standard for extended application, assessment reports should be produced in accordance with the principles of **BS EN 15725** and should include details of the test evidence that has been used to support the assessment.

- B4** Tests and assessments should be carried out by organisations with the necessary expertise. Organisations listed as ‘notified bodies’ in accordance with the European construction products regulation or laboratories accredited by the United Kingdom Accreditation Service for the relevant test standard can be assumed to have the necessary expertise.

**NOTE:** Standard fire tests do not directly measure fire hazard. They measure or assess the response of a material or system to exposure to one or more aspects of fire conditions. Performance in fire tests is only one of a number of factors that should be taken into account.

## Fire resistance

- B5** Common to all of the provisions of Part B of the Building Regulations is the property of fire resistance. Fire resistance is a measure of one or more of the following.
- Resistance to collapse** (loadbearing capacity), which applies to loadbearing elements only, denoted R in the European classification of the resistance to fire performance.
  - Resistance to fire penetration** (integrity), denoted E in the European classification of the resistance to fire performance.
  - Resistance to the transfer of excessive heat** (insulation), denoted I in the European classification of the resistance to fire performance.
- B6** The standards of fire resistance necessary for a particular building are based on assumptions about the severity of fires and the consequences should an element fail. Fire severity is estimated in very broad terms from the use of the **building** (its **purpose group**), on the assumption that the building contents (which constitute the fire load) are similar for **buildings** with the same use.
- B7** Because the use of **buildings** may change, a precise estimate of fire severity based on the fire load due to a particular use may be misleading. Therefore if a fire engineering approach of this kind is adopted, the likelihood that the fire load may change in the future needs to be considered.
- B8** Performance in terms of the fire resistance to be met by elements of structure, doors and other forms of construction is classified in accordance with one of the following.
- BS EN 13501-2.**
  - BS EN 13501-3.**
  - BS EN 13501-4.**
- B9** Fire resistance is measured in minutes. This relates to time elapsed in a standard test and should not be confused with real time.
- B10** The fire resistance necessary for different circumstances is set out in the following tables.
- Table B2 gives the specific requirements for each **element of structure**.
  - Table B3 sets out the minimum periods of fire resistance for **elements of structure**.
  - Table B4 sets out limitations on the use of uninsulated **fire resisting** glazed elements.
- B11** This document uses the European classification system for fire resistance set out in **BS EN 13501-2 to 4**; however, there may be some products lawfully on the market using the classification system set out in previous editions. In those situations the equivalent values given in table B1 can be used.

## Roofs

- B12** Performance of the resistance of roofs to external fire exposure is measured in terms of penetration through the roof construction and the spread of flame over its surface.
- B13** Roof constructions are classified within the European system as  $B_{\text{ROOF}}(t4)$ ,  $C_{\text{ROOF}}(t4)$ ,  $D_{\text{ROOF}}(t4)$ ,  $E_{\text{ROOF}}(t4)$  or  $F_{\text{ROOF}}(t4)$  in accordance with **BS EN 13501-5**.  $B_{\text{ROOF}}(t4)$  indicates the highest performance, and  $F_{\text{ROOF}}(t4)$  the lowest.
- B14** **BS EN 13501-1** refers to four separate roof tests. The suffix (t4) used in paragraph B13 indicates that Test 4 is to be used for the purposes of this approved document.

## Reaction to fire

- B15** Reaction to fire relates to the degree to which a product will contribute, by its own decomposition, to a fire under specified conditions. Products, other than floorings, are classified as A1, A2, B, C, D or E (with class A1 being the highest performance and E being the lowest) in accordance with **BS EN 13501-1**.
- B16** The classes of reaction to fire performance of A2, B, C, D and E are accompanied by additional classifications related to the production of smoke (s1, s2, s3) and/or flaming droplets/particles (d0, d1, d2). These additional classifications are not used in this document.
- B17** To reduce the testing burden on manufacturers, **BS EN 13238** defines a number of standard substrates that produce test results representative of different end use applications. The standard substrate selected for testing should take account of the intended end use applications (field of application) of the product and represent end use substrates that have a density of a minimum of 75% of the standard substrate's nominal density. The classification for reaction to fire achieved during testing is only valid when the product is used within this field of application, i.e. when the product is fixed to a substrate of that class in its end use.
- B18** Standard substrates include gypsum plasterboard (**BS EN 520**) with a density of  $700 \pm 100 \text{ kg/m}^3$ , calcium silicate board (**BS EN 14306**)  $870 \pm 50 \text{ kg/m}^3$  and fibre-cement board  $1800 \pm 200 \text{ kg/m}^3$ .

### NOTES:

- Standard calcium silicate board is not representative of gypsum plasterboard end use (due to the paper layer), but would be representative of most gypsum plasters (with densities of more than  $650 \text{ kg/m}^3$ ).
- Classifications based on tests using a plasterboard substrate would also be acceptable for products bonded to a gypsum plaster end use substrate.

## Thermoplastic materials

- B19** **Thermoplastic material** is any synthetic polymeric material that has a softening point below  $200^\circ\text{C}$  if tested to **BS EN ISO 306** Method A120. Products formed from these materials cannot always be classified in the normal way. In those circumstances the following approach can be followed.
- B20** For the purposes of requirements B2 and B4, **thermoplastic materials** should be classified as TP(a) rigid, TP(a) flexible or TP(b), as follows:
- TP(a) rigid**
    - rigid solid uPVC sheet
    - solid (as distinct from double- or multi-skinned) polycarbonate sheet a minimum of 3mm thick
    - multi-skinned rigid sheet made from uPVC or polycarbonate that has a class 1 rating when tested to **BS 476-7**
    - any other rigid thermoplastic product, a specimen of which (at the thickness of the product as put on the market), when tested to **BS 2782-0** Method 508A, performs so that both:
      - the test flame extinguishes before the first mark
      - the duration of flaming or afterglow does not exceed 5 seconds following removal of the burner.

b. **TP(a) flexible**

Flexible products a maximum of 1mm thick that comply with the Type C requirements of **BS 5867-2** when tested to **BS 5438** Test 2 with the flame applied to the surface of the specimens for 5, 15, 20 and 30 seconds respectively, but excluding the cleansing procedure; and

c. **TP(b)**

- i. rigid solid polycarbonate sheet products a maximum of 3mm thick, or multi-skinned polycarbonate sheet products that do not qualify as TP(a) by test
- ii. other products which, when a specimen of the material between 1.5 and 3mm thick is tested in accordance with **BS 2782-0** Method 508A, have a maximum rate of burning of 50mm/minute.

**NOTE:** If it is not possible to cut or machine a 3mm thick specimen from the product, then a 3mm test specimen can be moulded from the same material as that used to manufacture the product.

**B21** A **thermoplastic material** alone when used as a lining to a wall or **ceiling** cannot be assumed to protect a substrate. The surface rating of both **thermoplastic material** and substrate must therefore meet the required classification.

If, however, the **thermoplastic material** is fully bonded to a non-thermoplastic substrate, then only the surface rating of the composite needs to meet the required classification.

**B22** **Thermoplastic materials** used for window glazing, **rooftlights** and lighting diffusers within **suspended ceilings** do not need to comply with paragraph A34 onwards. They are described in the guidance on requirements B2 and B4.

## National classifications for reaction to fire

**B23** This document uses the European classification system for reaction to fire set out in **BS EN 13501-1**; however, there may be some products lawfully on the market using the classification system set out in previous editions. Where this is the case, table B1 can be used for the purposes of this document.

**Table B1 Reaction to fire equivalence**

BS EN 13501 classification	Equivalent
A1	Non-combustible
A2	Limited combustibility
B	Class 0
C	Class 1 to <b>BS 476-7</b>
D	Class 3 to <b>BS 476-7</b>

**B24** Non-combustible means any material that, when tested to **BS 476-11**, does not either:

- a. flame
- b. cause a rise in temperature on either the thermocouple at the centre of the specimen or in the furnaces.

**B25** 'Limited combustibility' means either of the following.

- a. Any material of density 300kg/m<sup>3</sup> or more, which, when tested to **BS 476-11** both:
  - i. does not flame
  - ii. causes a rise in temperature on the furnace thermocouple not exceeding 20°C.
- b. Any material of density less than 300kg/m<sup>3</sup>, which, when tested to **BS 476-11**, both:
  - i. does not flame for more than 10 seconds
  - ii. causes a rise in temperature on the thermocouple at the centre of the specimen or in the furnace that is a maximum of 35°C and on the furnace thermocouple that is a maximum of 25°C.

**B26** Class 0 means any material that meets both of the following criteria.

- a. Class 1 to **BS 476-7**.
- b. Has a fire propagation index (I) of a maximum of 12 and sub-index (i1) of a maximum of 6, determined by using the method given in **BS 476-6**. Index of performance (I) relates to the overall test performance, whereas sub-index (i1) is derived from the first three minutes of the test.



**Table B2 Specific provisions of the test for fire resistance of elements of structure, etc.**

Part of building	Equivalent provisions when tested to the relevant part of BS 476 <sup>(1)</sup> (minutes)			Minimum provisions when tested to the relevant European Standard (minutes) <sup>(9)</sup>	Type of exposure
	Loadbearing capacity <sup>(2)</sup>	Integrity	Insulation		
1. <b>Structural</b> frame, beam or column.	See table B3	Not applicable	Not applicable	R see table B3	Exposed faces
2. <b>Loadbearing wall</b> (which is not also a wall described in any of the following items).	See table B3	Not applicable	Not applicable	R see table B3	Each side separately
3. <b>Floors</b> <sup>(3)</sup>					
a. between a shop and flat above	60 min or see table B3 (whichever is greater)	60 min or see table B3 (whichever is greater)	60 min or see table B3 (whichever is greater)	REI 60 or see table B3 (whichever is greater)	From underside <sup>(4)</sup>
b. any other floor – including compartment floors.	See table B3	See table B3	See table B3	REI see table B3	
4. <b>Roofs</b>					
a. any part forming an escape route	30 min or see table B3	30 min or see table B3	30 min or see table B3	REI 30 REI see table B3	From underside <sup>(4)</sup>
b. any roof that performs the function of a floor.					
5. <b>External walls</b>					
a. any part a maximum of 1000mm from any point on the relevant boundary <sup>(5)</sup>	See table B3	See table B3	See table B3	REI see table B3	Each side separately
b. any part a minimum of 1000mm from the relevant boundary <sup>(5)</sup>	See table B3	See table B3	15 min	RE see table B3 and REI 15	From inside the building
c. any part beside an external escape route (see section 3, diagram 3.11).	30 min	30 min	No provision <sup>(6), (7)</sup>	RE 30	From inside the building
6. <b>Compartment walls</b>					
Separating either:					
a. a flat from any other part of the building (see 7.1)	60 min or see table B3 (whichever is less)	60 min or see table B3 (whichever is less)	60 min or see table B3 (whichever is less)	REI 60 or see table B3 (whichever is less)	Each side separately
b. occupancies.					
7. <b>Compartment walls</b> (other than in item 6)	See table B3	See table B3	See table B3	REI see table B3	Each side separately

**Table B2 Continued**

Part of building	Equivalent provisions when tested to the relevant part of <b>BS 476</b> <sup>(1)</sup> (minutes)			Minimum provisions when tested to the relevant European Standard (minutes) <sup>(9)</sup>	Type of exposure
	Loadbearing capacity <sup>(2)</sup>	Integrity	Insulation		
<b>8. Protected shafts</b> Excluding any firefighting shaft:					Each side separately
a. any glazing	Not applicable	30	No provision <sup>(7)</sup>	E 30	
b. any other part between the shaft and a protected lobby/corridor	30 min	30 min	30 min	REI 30	
c. any part not described in (a) or (b) above.	See table B3	See table B3	See table B3	REI see table B3	
<b>9. Enclosure</b> (that does not form part of a compartment wall or a protected shaft) to a:					Each side separately
a. protected stairway	30 min	30 min	30 min <sup>(8)</sup>	REI 30 <sup>(8)</sup>	
b. lift shaft.	30 min	30 min	30 min	REI 30	
<b>10. Firefighting shafts</b>	120 min	120 min	120 min	REI 120	From side remote from shaft
a. construction that separates firefighting shaft from rest of building	60 min	60 min	60 min	REI 60	From shaft side
b. construction that separates firefighting stair, firefighting lift shaft and firefighting lobby.	60 min	60 min	60 min	REI 60	Each side separately
<b>11. Enclosure</b> (that is not a compartment wall or described in item 8) to a:					Each side separately
a. protected lobby	30 min	30 min	30 min <sup>(8)</sup>	REI 30 <sup>(8)</sup>	
b. protected corridor.	30 min	30 min	30 min <sup>(8)</sup>	REI 30 <sup>(8)</sup>	
<b>12. Sub-division of a corridor</b>	30 min	30 min	30 min <sup>(8)</sup>	REI 30 <sup>(8)</sup>	Each side separately

Table B2 Continued

Part of building	Equivalent provisions when tested to the relevant part of BS 476 <sup>(1)</sup> (minutes)			Minimum provisions when tested to the relevant European Standard (minutes) <sup>(9)</sup>	Type of exposure
	Loadbearing capacity <sup>(2)</sup>	Integrity	Insulation		
<b>13. Fire resisting construction</b>					Each side separately
a. construction that encloses places of special fire hazard	30 min	30 min	30 min	REI 30	
b. construction between store rooms and sales area in shops	30 min	30 min	30 min	REI 30	
c. fire resisting subdivision	30 min	30 min	30 min	REI 30	
d. construction that encloses bedrooms and ancillary accommodation in care homes.	30 min	30 min	30 min	REI 30	
<b>14. Enclosure</b> in a flat to a protected entrance hall, or to a protected landing.	30 min	30 min	30 min <sup>(8)</sup>	REI 30 <sup>(8)</sup>	Each side separately
<b>15. Cavity barrier</b>	Not applicable	30 min	15 min	E 30 and EI 15	Each side separately
<b>16. Ceiling</b> diagram 8.3.	Not applicable	30 min	30 min	EI 30	From underside
<b>17. Duct</b> described in paragraph 9.16.	Not applicable	30 min	No provision	E 30	From outside
<b>18. Casing</b> around a drainage system described in diagram 9.4.	Not applicable	30 min	No provision	E 30	From outside
<b>19. Flue walls</b> described in diagram 9.5.	Not applicable	Half the period given in table B3 for the compartment wall/floor	Half the period given in table B3 for the compartment wall/floor	EI half the period given in table B3 for the compartment wall/floor	From outside

**Table B2 Continued**

Part of building	Equivalent provisions when tested to the relevant part of <b>BS 476</b> <sup>(1)</sup> (minutes)			Minimum provisions when tested to the relevant European Standard (minutes) <sup>(9)</sup>	Type of exposure
	Loadbearing capacity <sup>(2)</sup>	Integrity	Insulation		
20. <b>Fire doorsets</b>	See table C1				

**NOTES:**

- BS 476-20** for general principles **BS 476-21** for loadbearing elements, **BS 476-22** for non-loadbearing elements, **BS 476-23** for fire-protecting suspended ceilings and **BS 476-24** for ventilation ducts. **BS 476-8** results are acceptable for items tested or assessed before 1 January 1988.
- Applies to loadbearing elements only (see paragraph B5).
- Guidance on increasing the fire resistance of existing timber floors is given in BRE Digest 208.
- Only if a suspended ceiling meets the appropriate provisions should it be relied on to add to the fire resistance of the floor.
- Such walls may contain areas that need not be fire resisting (unprotected areas). See section 10.
- Unless needed as part of a wall in item 5a or 5b.
- Except for any limitations on glazed elements given in table B4.
- See table B4 for permitted extent of uninsulated glazed elements.
- National classifications do not necessarily equate to European classifications. For a European classification, products should be tested accordingly.  
In the European classification:  
'R' is the resistance to fire in terms of loadbearing capacity.  
'E' is the resistance to fire in terms of integrity.  
'I' is the resistance to fire in terms of insulation.

**Table B3 Minimum periods of fire resistance**

Purpose group of building	Minimum periods of fire resistance (minutes) in a:					
	Basement storey* including floor over		Ground or upper storey			
	Depth (m) of the lowest basement		Height (m) of top floor above ground, in a building or separated part of a building			
	More than 10	Up to 10	Up to 5	Up to 18	Up to 30	More than 30
1. Residential:						
a. Block of flats						
– without sprinkler system	90 min	60 min	30 min <sup>†</sup>	60 min <sup>#</sup>	90 min <sup>•</sup>	Not permitted
– with sprinkler system	90 min	60 min	30 min <sup>†</sup>	60 min <sup>#</sup>	90 min <sup>•</sup>	120 min <sup>•</sup>
b. Institutional	90 min	60 min	30 min <sup>†</sup>	60 min	90 min	120 min <sup>**</sup>
c. Other residential	90 min	60 min	30 min <sup>†</sup>	60 min	90 min	120 min <sup>**</sup>
2. Office:						
– without sprinkler system	90 min	60 min	30 min <sup>†</sup>	60 min	90 min	Not permitted
– with sprinkler system <sup>(2)</sup>	60 min	60 min	30 min <sup>†</sup>	30 min <sup>†</sup>	60 min	120 min <sup>**</sup>
3. Shop and commercial:						
– without sprinkler system	90 min	60 min	60 min	60 min	90 min	Not permitted
– with sprinkler system <sup>(2)</sup>	60 min	60 min	30 min <sup>†</sup>	60 min	60 min	120 min <sup>**</sup>
4. Assembly and recreation:						
– without sprinkler system	90 min	60 min	60 min	60 min	90 min	Not permitted
– with sprinkler system <sup>(2)</sup>	60 min	60 min	30 min <sup>†</sup>	60 min	60 min	120 min <sup>**</sup>
5. Industrial:						
– without sprinkler system	120 min	90 min	60 min	90 min	120 min	Not permitted
– with sprinkler system <sup>(2)</sup>	90 min	60 min	30 min <sup>†</sup>	60 min	90 min	120 min <sup>**</sup>
6. Storage and other non-residential:						
a. any building or part not described elsewhere:						
– without sprinkler system	120 min	90 min	60 min	90 min	120 min	Not permitted
– with sprinkler system <sup>(2)</sup>	90 min	60 min	30 min <sup>†</sup>	60 min	90 min	120 min <sup>**</sup>
b. car park for light vehicles:						

**Table B3 Continued**

Purpose group of building	Minimum periods of fire resistance (minutes) in a:					
	Basement storey* including floor over		Ground or upper storey			
	Depth (m) of a lowest basement		Height (m) of top floor above ground, in a building or separated part of a building			
	More than 10	Up to 10	Up to 5	Up to 18	Up to 30	More than 30
i. open sided car park <sup>(3)</sup>	Not applicable	Not applicable	15 min <sup>†</sup>	15 min <sup>†</sup>	15 min <sup>†</sup>	60–120 min <sup>**</sup>
ii. any other car park	90 min	60 min	30 min <sup>†</sup>	60 min <sup>(4)</sup>	90 min <sup>(4)</sup>	60–120 min <sup>**</sup>

**NOTES:**

For single storey buildings, the periods under the heading ‘up to 5’ apply. If single storey buildings have basements, for the basement storeys the period appropriate to their depth applies.

\* For the floor over a basement, or if there is more than one basement, the floor over the topmost basement, the higher of the period for the basement storey and the period for the ground or upper storey applies.

† For compartment walls that separate buildings, the period is increased to a minimum of 60 minutes.

• For any floor that does not contribute to the support of the building within a flat of more than one storey, the period is reduced to 30 minutes.

\*\* For elements that do not form part of the structural frame, the period is reduced to 90 minutes.

‡ For elements that protect the means of escape, the period is increased to 30 minutes.

# For flat conversions, refer to paragraph 6.6 regarding the acceptability of 30 minutes.

1. Refer to note 1, table B2 for the specific provisions of test.

2. ‘With sprinkler system’ means that the building is fitted throughout with an automatic sprinkler system in accordance with paragraph 0.13.

3. The car park should comply with the relevant provisions in the guidance on requirement B3, section 11 of Volume 2.

4. For the purposes of meeting the Building Regulations, the following types of steel elements are deemed to have satisfied the minimum period of fire resistance of 15 minutes when tested to the European test method.

- i. Beams supporting concrete floors maximum  $H_p/A=230m^{-1}$  operating under full design load.
- ii. Free-standing columns, maximum  $H_p/A=180m^{-1}$  operating under full design load.
- iii. Wind bracing and struts, maximum  $H_p/A=210m^{-1}$  operating under full design load.

Guidance is also available in **BS 5950-8**.

## Application of the fire resistance standards in table B3

**B27** The following guidance should be used when applying the fire resistance standards in table B3.

- a. If one **element of structure** supports or carries or gives stability to another, the fire resistance of the supporting element should be no less than the minimum period of fire resistance for the other element (whether that other element is loadbearing or not). In some circumstances, it may be reasonable to vary this principle, for example:
  - i. if the supporting structure is in the open air and is not likely to be affected by the fire in the **building**
  - ii. if the supporting structure is in a different **compartment**, with a **fire-separating element** (that has the higher standard of fire resistance) between the supporting and the separated structure
  - iii. if a plant room on the roof needs greater fire resistance than the elements of structure that support it.
- b. If an **element of structure** forms part of more than one **building** or **compartment**, that element should be constructed to the standard of the higher of the relevant provisions.
- c. If, due to the slope of the ground, one side of a basement is open at ground level (which allows smoke to vent and gives access for firefighting) for **elements of structure** in that storey it may be appropriate to adopt the standard of fire resistance that applies to above-ground structures.
- d. Although most **elements of structure** in a **single storey building** may not need fire resistance, fire resistance is needed if one of the following applies to the element.
  - i. It is part of, or supports, an **external wall**, and there is provision in the guidance on requirement B4 to limit the extent of openings and other **unprotected areas** in the wall.
  - ii. It is part of, or supports, a **compartment wall**, including a wall that is common to two or more **buildings**.
  - iii. It supports a **gallery**.

**B28** For the purposes of this paragraph, the ground **storey** of a **building** that has one or more **basement storeys** and no upper **storeys** may be considered as a **single storey building**. The fire resistance of the **basement storeys** should be that specified for basements.

**Table B4 Limitations on the use of uninsulated glazed elements on escape routes. These limitations *do not* apply to glazed elements that satisfy the relevant insulation criterion, see table B2**

Position of glazed element	Maximum total glazed area in parts of a building with access to:			
	A single stairway		More than one stairway	
	Walls	Door leaf	Walls	Door leaf
<b>Flats</b>				
1. Within the enclosures of a protected entrance hall or protected landing, or within fire resisting separation shown in section 3, diagram 3.4.	Fixed fanlights only	Unlimited above 1100mm from floor	Fixed fanlights only	Unlimited above 1100mm from floor
<b>General</b>				
2. Between residential/sleeping accommodation and a common escape route (corridor, lobby or stair)	Nil	Nil	Nil	Nil
3. Between a protected stairway <sup>(1)</sup> and either: a. the accommodation b. a corridor that <i>is not</i> a protected corridor <i>other than in item 2 above</i> .	Nil	25% of door area	Unlimited above 1100mm <sup>(2)</sup>	50% of door area
4. Between either: a. a protected stairway <sup>(1)</sup> and a protected lobby or protected corridor b. accommodation and a protected lobby <i>other than in item 2 above</i> .	Unlimited above 1100mm from floor	Unlimited above 100mm from floor	Unlimited above 100mm from floor	Unlimited above 100mm from floor
5. Between the accommodation and a protected corridor that forms a dead end, <i>other than in item 2 above</i> .	Unlimited above 1100mm from floor	Unlimited above 100mm from floor	Unlimited above 1100mm from floor	Unlimited above 100mm from floor
6. Between accommodation and any other corridor, or subdividing corridors, <i>other than in item 2 above</i> .	Not applicable	Not applicable	Unlimited above 100mm from floor	Unlimited above 100mm from floor
7. Beside an external escape route.	Unlimited above 1100mm from floor	Unlimited above 1100mm from floor	Unlimited above 1100mm from floor	Unlimited above 1100mm from floor
8. Beside an external escape stair (see paragraph 3.59 and diagram 3.11) or roof escape (see paragraph 3.27).	Unlimited	Unlimited	Unlimited	Unlimited

**NOTES:**

1. If the protected stairway is also a protected shaft or a firefighting stair (see section 15), there may be further restrictions on the use of glazed elements.
2. Measured vertically from the landing floor level or the stair pitch line.
3. The 100mm limit is intended to reduce the risk of fire spreading from a floor covering.

Items 1 and 4 apply also to single storey buildings.

Fire resisting glass should be marked with the name of the manufacturer and the name of the product.

Further guidance can be found in *A guide to best practice in the specification and use of fire-resistant glazed systems* published by the Glass and Glazing Federation.



## Appendix C: Fire doorsets

- C1** All fire doorsets should have the performance shown in table C1, based on one of the following.
- Fire resistance in terms of integrity, for a period of minutes, when tested to **BS 476-22**, e.g. FD 30. A suffix (S) is added for doorsets where restricted smoke leakage at ambient temperatures is needed.
  - As determined with reference to Commission Decision 2000/367/EC regarding the classification of the resistance to fire performance of construction products, construction works and parts thereof. All fire doorsets should be classified in accordance with **BS EN 13501-2**, tested to the relevant European method from the following.
    - BS EN 1634-1**.
    - BS EN 1634-2**.
    - BS EN 1634-3**.
  - As determined with reference to European Parliament and Council Directive 95/16/EC (which applies to lifts that permanently serve buildings and constructions and specified safety components) on the approximation of laws of Member States relating to lifts ('Lifts Directive') implementing the Lifts Regulations 1997 (SI 1997/831) and calling upon the harmonised standard **BS EN 81-58**.
- C2** The performance requirement is in terms of integrity (E) for a period of minutes. An additional classification of  $S_a$  is used for all doors where restricted smoke leakage at ambient temperatures is needed.
- C3** The requirement is for test exposure from each side of the doorset separately. The exception is lift doors, which are tested from the landing side only.
- C4** Any test evidence used to verify the fire resistance rating of a doorset or shutter should be checked to ensure both of the following.
- It adequately demonstrates compliance.
  - It is applicable to the **complete installed assembly**. Small differences in detail may significantly affect the rating.
- Until relevant harmonised product standards are published, for the purposes of meeting the Building Regulations, products tested in accordance with **BS EN 1634-1** (with or without pre-fire test mechanical conditioning) that achieve the minimum performance in table C1 will be deemed to satisfy the provisions.
- C5** All fire doorsets, including to flat entrances, should be fitted with a self-closing device, except for all of the following.
- Fire doorsets to cupboards.
  - Fire doorsets to service ducts normally locked shut.
  - Fire doorsets within flats.

- C6** If a **self-closing device** would be considered to interfere with the normal approved use of the **building**, self-closing fire doors may be held open by one of the following.
- A fusible link, but not if the doorset is in an opening provided as a **means of escape** unless it complies with paragraph C7.
  - An **automatic release mechanism** activated by an automatic fire detection and alarm system.
  - A door closer delay device.
- C7** Two **fire doorsets** may be fitted in the same opening if each door is capable of closing the opening, so the total fire resistance is the sum of their individual resistances. If the opening is provided as a **means of escape**, both **fire doorsets** should be self-closing.
- If one **fire doorset** is capable of being easily opened by hand and has a minimum of 30 minutes' fire resistance, the other **fire doorset** should comply with both of the following.
- Be fitted with an automatic **self-closing device**.
  - Be held open by a fusible link.
- C8** **Fire doorsets** often do not provide any significant insulation. Unless providing both integrity and insulation in accordance with Appendix B, table B2, a maximum of 25% of the length of a **compartment wall** should consist of door openings.
- Where it is practicable to maintain a clear space on both sides of the doorway, the above percentage may be greater.
- C9** Rolling shutters should be capable of manual opening and closing for firefighting purposes (see section 15). Rolling shutters across a **means of escape** should only be released by a heat sensor, such as a fusible link or electric heat detector, in the immediate vicinity of the door.
- Unless a shutter is also intended to partially descend as part of a **boundary** to a smoke reservoir, shutters across a **means of escape** should not be closed by smoke detectors or a **fire alarm system**.
- C10** Unless shown to be satisfactory when tested as part of a **fire doorset** assembly, the essential components of any hinge on which a fire door is hung should be made entirely from materials that have a minimum melting point of 800°C.
- C11** Except for doorsets listed in paragraph C12, all **fire doorsets** should be marked with the one of the following fire safety signs, complying with **BS 5499-5**, as appropriate.
- To be kept closed when not in use – mark 'Fire door keep shut'.
  - To be kept locked when not in use – mark 'Fire door keep locked shut'.
  - Held open by an **automatic release mechanism** or free swing device – mark 'Automatic fire door keep clear'.
- All **fire doorsets** should be marked on both sides, except **fire doorsets** to cupboards and service ducts, which should be marked on the outside.
- C12** The following **fire doorsets** are not required to comply with paragraph C11.
- Doors to and within **flats**.
  - Bedroom doors in 'other residential' premises.
  - Lift entrance/landing doors.
- C13** The performance of some doorsets is linked to the minimum periods of fire resistance for **elements of structure** given in tables B2 and B3. Limitations on the use of uninsulated glazing in **fire doorsets**

are given in table B4.

- C14** Recommendations for the specification, design, construction, installation and maintenance of **fire doorsets** constructed with non-metallic door leaves are given in **BS 8214**.

Guidance on timber **fire resisting** doorsets, in relation to the new European test standard, may be found in *Timber fire resisting doorsets: maintaining performance under the new European test standard* published by the Timber Research and Development Association (TRADA).

Guidance for metal doors is given in *Code of practice for fire resisting metal doorsets* published by the Door and Shutter Manufacturers' Association (DSMA) in 2010.

- C15** Hardware used on fire doors can significantly affect their performance in a fire. Notwithstanding the guidance in this approved document, guidance is available in *Hardware for fire and escape doors* published by the Door and Hardware Federation (DHF) and Guild of Architectural Ironmongers (GAI).

**Table C1 Provisions for fire doorsets**

Position of door	Minimum fire resistance of door in terms of integrity (minutes) when tested to <b>BS 476-22</b> <sup>(1)</sup>	Minimum fire resistance of door in terms of integrity (minutes) when tested to the relevant European Standard <sup>(3)</sup>
1. <b>In a compartment wall separating buildings</b>	Same as for the wall in which the door is fitted, but a minimum of 60 minutes	Same as for the wall in which the door is fitted, but a minimum of 60 minutes
2. <b>In a compartment wall:</b>		
a. if it separates a flat from a space in common use	FD 30S <sup>(2)</sup>	E 30 S <sub>a</sub> <sup>(2)</sup>
b. enclosing a protected shaft forming a stairway wholly or partly above the adjoining ground in a building used for flats, other residential, assembly and recreation, or office purposes	FD 30S <sup>(2)</sup>	E 30 S <sub>a</sub> <sup>(2)</sup>
c. enclosing a protected shaft forming a stairway not described in (b) above	Half the period of fire resistance of the wall in which it is fitted, but 30 minutes minimum and with suffix S <sup>(2)</sup>	Half the period of fire resistance of the wall in which it is fitted, but 30 minutes minimum and with suffix S <sub>a</sub> <sup>(2)</sup>
d. enclosing a protected shaft forming a lift or service shaft	Half the period of fire resistance of the wall in which it is fitted, but 30 minutes minimum	Half the period of fire resistance of the wall in which it is fitted, but 30 minutes minimum
e. not described in (a), (b), (c) or (d) above.	Same as for the wall in which it is fitted, but add S <sup>(2)</sup> if the door is used for progressive horizontal evacuation under the guidance to requirement B1	Same as for the wall in which it is fitted, but add S <sub>a</sub> <sup>(2)</sup> if the door is used for progressive horizontal evacuation under the guidance to requirement B1
3. <b>In a compartment floor</b>	Same as for the floor in which it is fitted	Same as for the floor in which it is fitted

Table C1 Continued

Position of door	Minimum fire resistance of door in terms of integrity (minutes) when tested to BS 476-22 <sup>(1)</sup>	Minimum fire resistance of door in terms of integrity (minutes) when tested to the relevant European Standard <sup>(3)</sup>
4. <b>Forming part of the enclosures of:</b>		
a. a protected stairway (except as described in item 9)	FD 30S <sup>(2)</sup>	E 30 S <sub>a</sub> <sup>(2)</sup>
b. a lift shaft (see paragraph 3.91b) that does not form a protected shaft in 2(b), (c) or (d) above.	FD 30	E 30
5. <b>Forming part of the enclosure of:</b>		
a. a protected lobby approach (or protected corridor) to a stairway	FD 30S <sup>(2)</sup>	E 30 S <sub>a</sub> <sup>(2)</sup>
b. any other protected corridor	FD 20S <sup>(2)</sup>	E 20 S <sub>a</sub> <sup>(2)</sup>
c. a protected lobby approach to a lift shaft (see paragraphs 3.93 and 3.95).	FD 30S <sup>(2)</sup>	E 30 S <sub>a</sub> <sup>(2)</sup>
6. <b>Giving access to an external escape route</b>	FD 30	E 30
7. <b>Sub-dividing:</b>		
a. corridors connecting alternative exits	FD 20S <sup>(2)</sup>	E 20 S <sub>a</sub> <sup>(2)</sup>
b. dead-end portions of corridors from the remainder of the corridor	FD 20S <sup>(2)</sup>	E 20 S <sub>a</sub> <sup>(2)</sup>
8. <b>Any door within a cavity barrier</b>	FD 30	E 30
9. <b>Any door that forms part of the enclosure to a protected entrance hall or protected landing in a flat</b>	FD 20	E 20
10. <b>Any door that forms part of the enclosure:</b>		
a. to a place of special fire risk	FD 30	E 30
b. to ancillary accommodation in care homes (see paragraph 2.51 of Approved Document B volume 2).	FD 30	E 30

**NOTES:**

1. To BS 476-22 (or BS 476-8 subject to paragraph B8 in Appendix B).
2. Unless pressurisation techniques that comply with BS EN 12101-6 are used, these doors should also comply with one of the following conditions.
  - a. Have a leakage rate not exceeding 3m<sup>3</sup>/m/hour (from head and jambs only) when tested at 25Pa under BS 476-31.1
  - b. Meet the additional S<sub>a</sub> classification when tested to BS EN 1634-3.
3. National classifications do not necessarily equate with European classifications. For a European classification, products should be tested accordingly.

# Appendix D: Methods of measurement

## Occupant capacity

- D1** The occupant capacity of a **room, storey, building** or part of a **building** is the maximum number of people it is designed to hold. When area is measured, the following should be *excluded*.
- Stair enclosures.
  - Lifts.
  - Sanitary accommodation.
  - Any other fixed part of the **building** structure.

## Travel distance

- D2** **Travel distance** is measured as the shortest route. Both of the following should be observed.
- If there is fixed seating or other fixed obstructions, the shortest route is along the centre line of the seatways and gangways.
  - If the route includes a stair, the shortest route is along the pitch line on the centre line of travel.

## Width

- D3** Width is measured according to the following.
- For a **door (or doorway)**, the clear width when the door is open (diagram D1).
  - For an **escape route**, either:
    - when the route is defined by walls: the width at 1500mm above floor level
    - elsewhere: the minimum width of passage available between any fixed obstructions.
  - For a **stair**, the clear width between the walls or balustrades. On **escape routes** and stairs, handrails and strings intruding into the width by a maximum of 100mm may be ignored. Rails used for guiding a stair-lift may be ignored, but it should be possible to park the lift's chair or carriage in a position that does not obstruct the stair or landing.

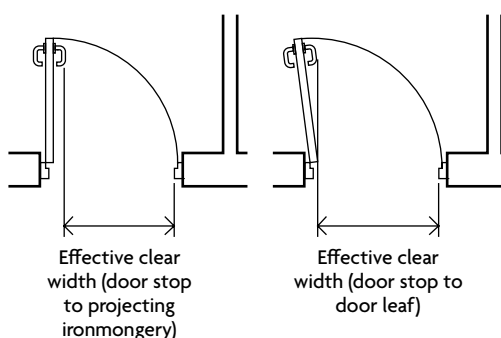
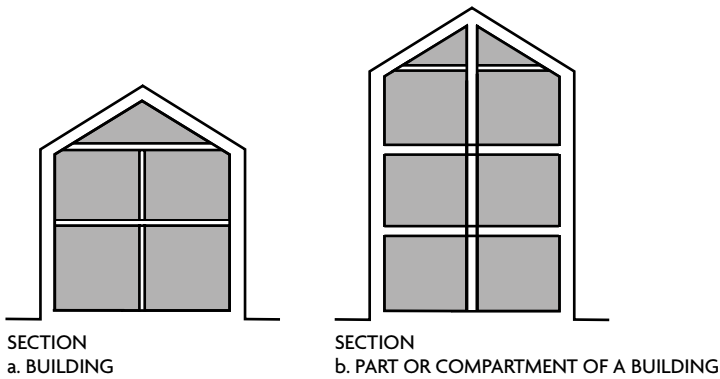


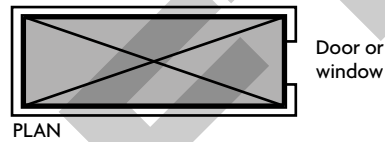
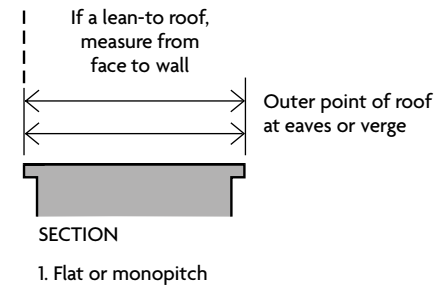
Diagram D1 Measurement of door width



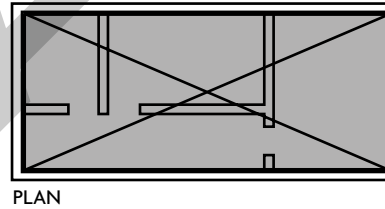
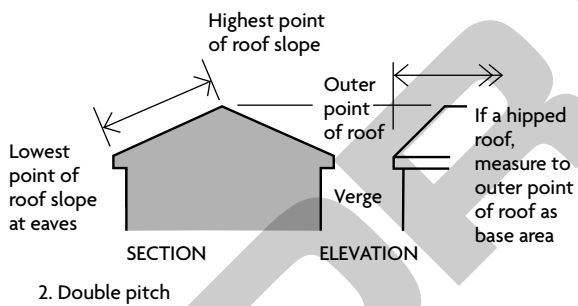
In every case measure the volume contained by the following elements.

- Under surface of roof as appropriate.
- Upper surface of lowest floor.
- The inner surface of enclosed walls (when there is not an enclosing outside wall, measure to the outermost edge of the floor), ignoring internal walls and partitions.

Diagram D2 Cubic capacity

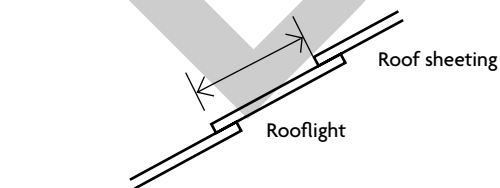


4. Floor area: room, garage, conservatory or outbuilding, measure to inner surface of enclosing walls



When there is not an outer enclosing wall, measure to the outermost edge of the floor slab

5. Floor area: storey, part or compartment, measure to inner surface of enclosing walls and include internal walls and partitions



3. Rooflight, surface area: roofs and rooflights, in each case measure the visible area

Diagram D3 Area

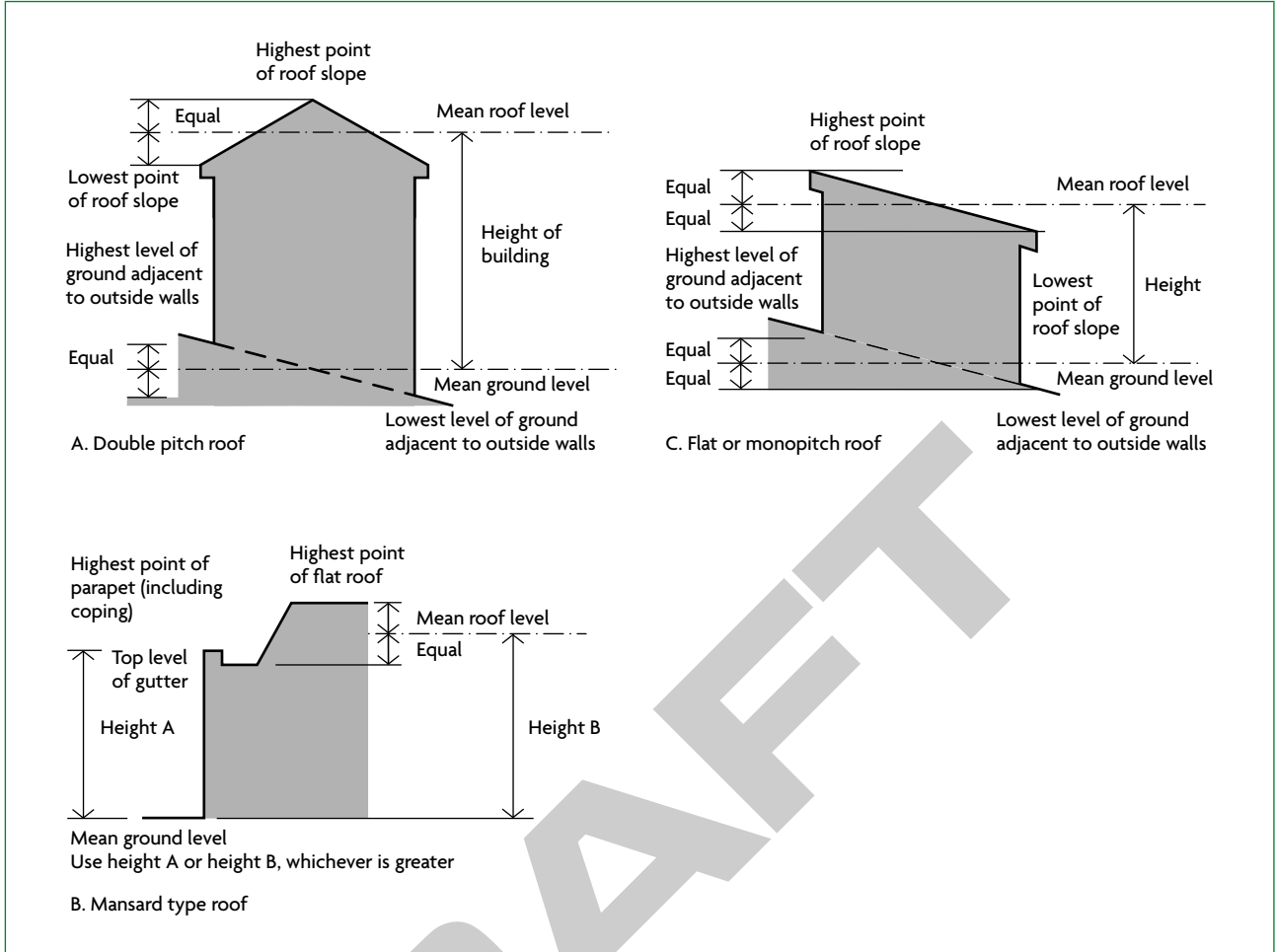
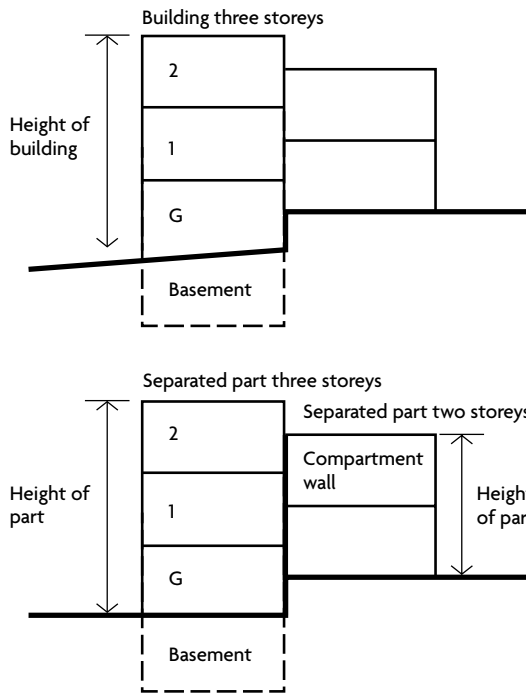


Diagram D4 Height of building



To count the number of storeys in a building, or in a separated part of a building, count only at the position which gives the greatest number and exclude any basement storeys

**NOTES:**

1. In assembly buildings, a gallery is included as a storey, but not if it is a loading gallery, fly gallery, stage grid, lighting bridge, or any gallery provided for similar purposes, or for maintenance and repair.
2. In other purpose group buildings, galleries are not counted as a storey.

Diagram D5 Number of storeys

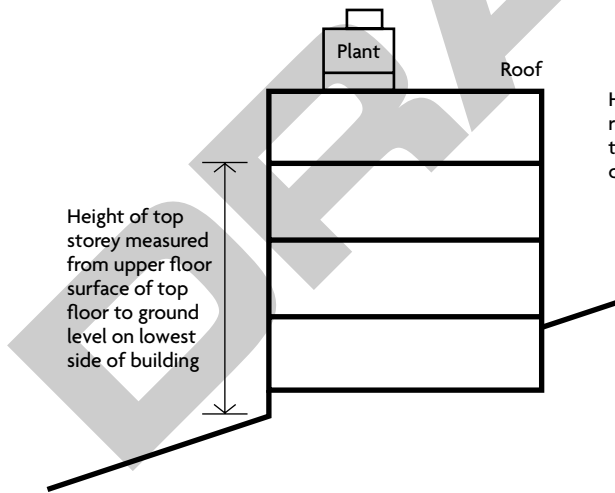
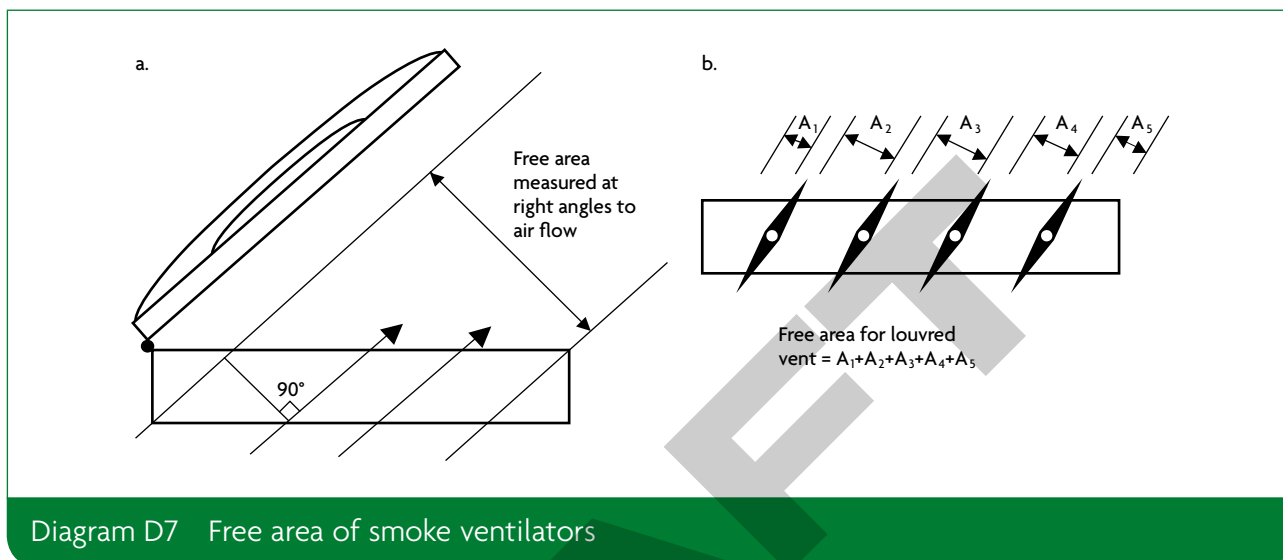


Diagram D6 Height of top storey in building



## Free area of smoke ventilators

- D4** The free area of a smoke ventilator should be measured by either of the following.
- The declared aerodynamic free area in accordance with **BS EN 12101-2**.
  - The total unobstructed cross-sectional area, measured in the plane where the area is at a minimum and at right angles to the direction of air flow (diagram D7).



# Appendix E: Standards referred to

## British Standards

**NOTE:** All the British standard and European standards can be purchased at the following address: <https://shop.bsigroup.com/>. Alternatively access to the British and European standard may be gained at public reference libraries.

### **BS 476**

Fire tests on building materials and structures

### **BS 476-6**

Method of test for fire propagation for products [1989 + A1 2009]

### **BS 476-7**

Method of test to determine the classification of the surface spread of flame of products [1997]

### **BS 476-8**

Test methods and criteria for the fire resistance of elements of building construction [1972]

### **BS 476-11**

Method for assessing the heat emission from building materials [1982]

### **BS 476-20**

Fire tests on building materials and structures. Method for determination of the fire resistance of elements of construction (general principles) [1987]

### **BS 476-21**

Methods for determination of the fire resistance of loadbearing elements of construction [1987]

### **BS 476-22**

Methods for determination of the fire resistance of non-loadbearing elements of construction [1987]

### **BS 476-23**

Methods for determination of the contribution of components to the fire resistance of a structure [1987]

### **BS 476-24**

Method for determination of the fire resistance of ventilation ducts [1987]

### **BS 476-31.1**

Methods for measuring smoke penetration through doorsets and shutter assemblies. Method of measurement under ambient temperature conditions [1983]

### **BS 2782-0**

Methods of testing. Plastics. Introduction [2011]

### **BS 3251**

Specification. Indicator plates for fire hydrants and emergency water supplies [1976]

### **BS 4422**

Fire. Vocabulary [2005]

### **BS 4514**

Unplasticized PVC soil and ventilating pipes of 82.4mm minimum mean outside diameter, and fittings and accessories of 82.4mm and of other sizes. Specification [2001]

### **BS 5255**

Specification for thermoplastics waste pipe and fittings [1989]

### **BS 5266-1**

Emergency lighting. Code of practice for the emergency lighting of premises [2016]

### **BS 5306-2**

Fire extinguishing installations and equipment on premises. Specification for sprinkler systems [1990]

**BS 5438**

Methods of test for flammability of textile fabrics when subjected to a small igniting flame applied to the face or bottom edge of vertically oriented specimens [1989]

**BS 5446-2**

Fire detection and fire alarm devices for dwellings. Specification for heat alarms [2003]

**BS 5499**

Graphical symbols and signs

**BS 5499-1**

Safety signs, including fire safety signs. Specification for geometric shapes, colours and layout [2002]

**BS 5499-5**

Safety signs, including fire safety signs. Signs with specific safety meanings [2002]

**BS 5839**

Fire detection and fire alarm systems for buildings

**BS 5839-1**

Code of practice for system design, installation, commissioning and maintenance of systems in non-domestic premises [2017]

**BS 5839-3**

Specification for automatic release mechanisms for certain fire protection equipment [1988]

**BS 5839-6**

Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises [2013]

**BS 5867-2**

Specification for fabrics for curtains and drapes. Flammability requirements [1980]

**BS 5906**

Waste management in buildings. Code of practice [2005]

**BS 5950-8**

Structural use of steelwork in building. Code of practice for fire resistant design [2003]

**BS 7157**

Method of test for ignitability of fabrics used in the construction of large tented structures [1989]

**BS 8214**

Timber-based fire door assemblies. Code of practice [2016]

**BS 8519**

Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications. Code of practice [2010]

**BS 9251**

Fire sprinkler systems for domestic and residential occupancies. Code of practice [2014]

**BS 9252**

Components for residential sprinkler systems. Specification and test methods for residential sprinklers [2011]

**BS 9990**

Non automatic fire-fighting systems in buildings. Code of practice [2015]

**BS 9991**

Fire safety in the design, management and use of residential buildings. Code of practice [2015]

**BS 9999**

Fire safety in the design, management and use of buildings. Code of practice [2017]

## European Standards

### **BS EN 54**

Fire detection and fire alarm systems

### **BS EN 54-7**

Fire detection and fire alarm systems. Smoke detectors. Point detectors using scattered light, transmitted light or ionization [2001]

### **BS EN 54-11**

Fire detection and fire alarm systems. Manual call points [2001]

### **BS EN 81**

Safety rules for the construction and installation of lifts

### **BS EN 81-20**

Lifts for the transport of persons and goods. Passenger and goods passenger lifts [2014]

### **BS EN 81-58**

Examination and tests. Landing doors fire resistance test [2018]

### **BS EN 81-72**

Particular applications for passenger and goods passenger lifts. Firefighters lifts [2015]

### **BS EN ISO 306**

Plastics. Thermoplastic materials. Determination of Vicat softening temperature (VST) [2013]

### **BS EN 520**

Gypsum plasterboards. Definitions, requirements and test methods [2004 + A1 2009]

### **BS EN 1366-2**

Fire resistance tests for service installations. Fire dampers [2015]

### **BS EN 1634**

Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware

### **BS EN 1634-1**

Fire resistance test for door and shutter assemblies and openable windows [2014 + A1 2018]

### **BS EN 1634-2**

Fire resistance characterisation test for elements of building hardware [2008]

### **BS EN 1634-3**

Smoke control test for door and shutter assemblies [2004]

### **BS ISO 10294**

Fire resistance tests

### **BS ISO 10294-2**

Fire dampers for air distribution systems. Classification, criteria and field of application of test results [1999]

### **BS ISO 10294-5**

Fire dampers for air distribution systems. Intumescent fire dampers [2005]

### **BS EN 12101**

Smoke and heat control systems

### **BS EN 12101-2**

Natural smoke and heat exhaust ventilators [2017]

### **BS EN 12101-6**

Specification for pressure differential systems. Kits [2005]

### **BS EN 12845**

Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance [2015]

### **BS EN 13238**

Reaction to fire tests for building products. Conditioning procedures and general rules for selection of substrates [2010]

### **BS EN 13501**

Fire classification of construction products and building elements

**BS EN 13501-1**

Classification using test data from reaction to fire tests [2007 + A1 2009]

**BS EN 13501-2**

Classification using data from fire resistance tests, excluding ventilation services [2016]

**BS EN 13501-3**

Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers [2005 + A1 2009]

**BS EN 13501-4**

Classification using data from fire resistance tests on components of smoke control systems [2016]

**BS EN 13501-5**

Classification using data from external fire exposure to roof tests [2016]

**BS EN 14306**

Thermal insulation products for building equipment and industrial installations. Factory made calcium silicate (CS) products. Specification [2015]

**BS EN 14604**

Smoke alarm devices [2005]

**BS EN 15102**

Decorative wall coverings. Roll and panel form [2007 + A1 2011]

**BS EN 15650**

Ventilation for buildings. Fire dampers [2010]

**BS EN 15725**

Extended application reports on the fire performance of construction products and building elements [2010]

**BS EN 50200**

Method of test for resistance to fire of unprotected small cables for use in emergency circuits [2015]

# Appendix F: Other documents referred to

## Legislation

(available via [www.legislation.gov.uk](http://www.legislation.gov.uk))

Gas Safety (Installation and Use) Regulations 1998 (SI 1998/2451)

Health and Safety (Safety Signs and Signals) Regulations 1996 (SI 1996/341)

Lifts Regulations 1997 (SI 1997/831)

Pipelines Safety Regulations 1996 (SI 1996/825)

Prison Act 1952

Commission Decision 2000/367/EC of 3 May 2000 implementing Council Directive 89/106/EEC

## Other documents

### Publications

#### Association for Specialist Fire Protection (ASFP)

ASFP Red book – *Fire stopping and penetration seals for the construction industry*, 4th Edition ([www.asfp.org.uk](http://www.asfp.org.uk))

ASFP Grey book – *Fire and smoke resisting dampers* ([www.asfp.org.uk](http://www.asfp.org.uk))

ASFP Blue book – *Fire resisting ductwork*, 2nd Edition ([www.asfp.org.uk](http://www.asfp.org.uk))

#### Building Research Establishment Limited (BRE)

BRE report (BR 135) *Fire performance of external thermal insulation for walls of multi-storey buildings*, 3rd Edition [2013] ([www.bre.co.uk](http://www.bre.co.uk))

BRE report (BR 187) *External fire spread: Building separation and boundary distances*, 2nd Edition [2014] ([www.bre.co.uk](http://www.bre.co.uk))

BRE Digest 208 *Increasing the fire resistance of existing timber floors* [1988] ([www.bre.co.uk](http://www.bre.co.uk))

BRE report (BR 274) *Fire safety of PTFE-based materials used in buildings* [1994] ([www.bre.co.uk](http://www.bre.co.uk))

#### Department for Communities and Local Government

Regulatory Reform (Fire Safety) Order 2005 ([www.communities.gov.uk](http://www.communities.gov.uk))

### **Door and Hardware Federation and Guild of Architectural Ironmongers**

*Hardware for fire and escape doors* [2012]  
([www.firecode.org.uk](http://www.firecode.org.uk))

### **Door and Shutter Manufacturers' Association (DSMA)**

*Code of practice for fire resisting metal doorsets* [2010]  
([www.dhfonline.org.uk](http://www.dhfonline.org.uk))

### **Glass and Glazing Federation (GGF)**

*A guide to best practice in the specification and use of fire-resistant glazed systems* [2011]  
([www.ggf.org.uk](http://www.ggf.org.uk))

### **Health and Safety Executive (HSE)**

*Safety signs and signals. The Health and Safety Regulations 1996. Guidance on regulations, L64* [2015]  
([hse.gov.uk](http://hse.gov.uk))

### **International Association of Cold Storage Contractors (IACSC)**

*Design, construction, specification and fire management of insulated envelopes for temperature controlled environments* [1999]  
([www.gcca.org/about/europe](http://www.gcca.org/about/europe))

### **Passive Fire Protection Forum**

*Ensuring best practice for passive fire protection in buildings*  
([www.pfpf.org](http://www.pfpf.org))

### **Steel Construction Institute (SCI)**

*SCI Publication P288 Fire safe design: A new approach to multi-storey steel-framed buildings, 2nd Edition* [2000]

### **Timber Research and Development Associations (TRADA)**

*Timber fire resisting doorsets: Maintaining performance under the new European test standard* [2002]  
([www.trada.co.uk](http://www.trada.co.uk))

# List of approved documents

The following documents have been published to give guidance on how to meet the Building Regulations. You can find the date of the edition approved by the Secretary of State at [www.gov.uk](http://www.gov.uk).

## **Approved Document A**

Structure

## **Approved Document B**

Fire safety

Volume 1: Dwellings

## **Approved Document B**

Fire safety

Volume 2: Buildings other than dwellings

## **Approved Document C**

Site preparation and resistance to contaminants and moisture

## **Approved Document D**

Toxic substances

## **Approved Document E**

Resistance to the passage of sound

## **Approved Document F**

Ventilation

## **Approved Document G**

Sanitation, hot water safety and water efficiency

## **Approved Document H**

Drainage and waste disposal

## **Approved Document J**

Combustion appliances and fuel storage systems

## **Approved Document K**

Protection from falling, collision and impact

## **Approved Document L1A**

Conservation of fuel and power in new dwellings

## **Approved Document L1B**

Conservation of fuel and power in existing dwellings

## **Approved Document L2A**

Conservation of fuel and power in new buildings other than dwellings

## **Approved Document L2B**

Conservation of fuel and power in existing buildings other than dwellings

## **Approved Document M**

Access to and use of buildings

Volume 1: Dwellings

## **Approved Document M**

Access to and use of buildings

Volume 2: Buildings other than dwellings

## **Approved Document P**

Electrical safety – Dwellings

## **Approved Document Q**

Security – Dwellings

## **Approved Document 7**

Materials and workmanship



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