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Fire Safety in Dwellinghouses

Building Regulation Overview

London Building Control
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Introduction

Who we are? ☺

Legal stuff… controls 😐

Fire safety – Common practice and guidance ☺

The future… ☺

Questions??

https://www.quidbooks.com/post/worst-case-wednesday-how-extinguish-christmas-tree-fire

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Who we are?

London Building Control Ltd are one of the largest Corporate Approved Inspectors. LBC work to industry codes and building control performance standards to ensure our building control process provides added value - reducing unnecessary bureaucracy, delays and costs for our clients. With offices in London, Manchester, Welwyn Garden City, Chichester and Exeter we offer a high-level service for commercial, public sector and residential projects.

Our Professional Team

Our clients are important to us, so we take the time to listen to their needs and align our experience and expertise to ensure they are met. LBC's surveying team provide advice on all areas of compliance within Building Regulations. We provide pre-application advice and assistance to design teams throughout the process to ensure building regulation compliance.

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Michael Morgan – MSc, MRICS, CBuildE, MCABE

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How is '*Building Work*' assessed

Enforcing Legislation

Building Act 1984

Statutory Instrument

Building Regulations 2010 set the technical standards

GUIDANCE

- Approved Documents

- British/CE Standards: BSI British Standards, CE, BBA British Board of Agrement, TRADA
- Supplementary Guidance: NHBC, Building Control Alliance

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Technical Requirements?

Requirement

Requirement	*Limits on application*
Means of warning and escape	
B1. 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.	Requirement B1 does not apply to any prison provided under section 33 of the Prison Act 1952[(a)] (power to provide prisons, etc.).
	(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.

Technical requirements of the regulations are an Outcomes-based approach

Not prescription!

Appropriate – Reasonable – Adequate – Suitable

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Technical Requirements?

Responsibility?

Appropriate – Reasonable – Adequate – Suitable

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Technical Requirements?

Intention

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

a. There are sufficient means for giving early warning of fire to people in the building.

b. All people can escape to a place of safety without external assistance.

c. Escape routes are suitably located, sufficient in number and of adequate capacity.

d. Where necessary, escape routes are sufficiently protected from the effects of fire and smoke.

e. Escape routes are adequately lit and exits are suitably signed.

f. There are appropriate provisions to limit the ingress of smoke to the escape routes, or to restrict the spread of fire and remove smoke.

g. For buildings containing flats, there are appropriate provisions to support a stay put evacuation strategy.

The extent to which any of these measures are necessary is dependent on the use of the building, its size and its height.

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

Appropriate – Reasonable – Adequate – Suitable

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Section 7 of the Building Act!

Compliance or non-compliance with approved documents.

7.—(1) A failure on the part of a person to comply with an approved document does not of itself render him liable to any civil or criminal proceedings ; but if, in any proceedings whether civil or criminal, it is alleged that a person has at any time contravened a provision of building regulations—

(*a*) a failure to comply with a document that at that time was approved for the purposes of that provision may be relied upon as tending to establish liability, and

(*b*) proof of compliance with such a document may be relied on as tending to negative liability.

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Fire Safety in Dwelling Houses

Means of escape

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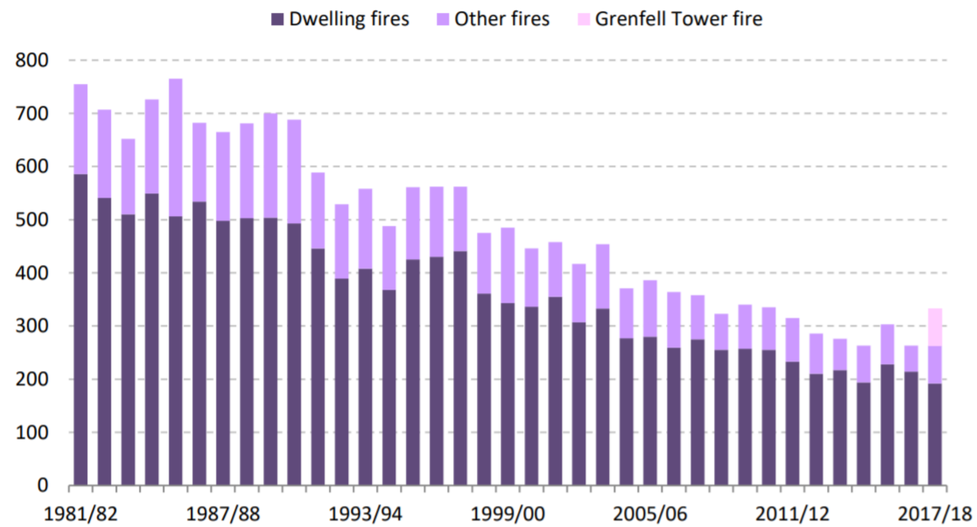
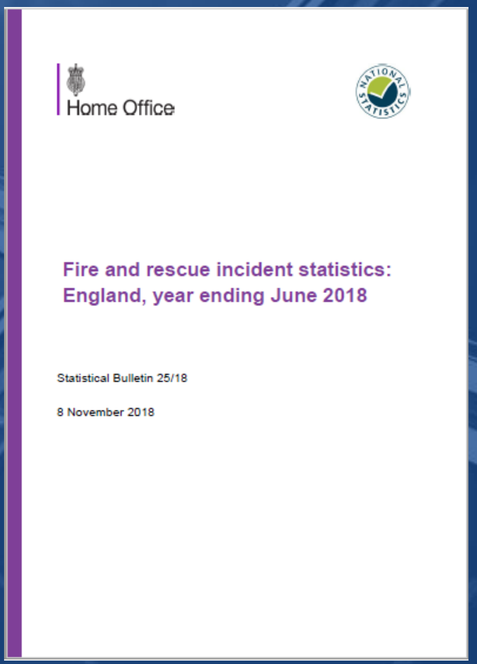
Why is Fire Safety important?

Figure 4.1 Total fire-related fatalities in dwellings or other fires, England; 1981/82 to 2017/18




Home Office

Fire and rescue incident statistics: England, year ending June 2018

Statistical Bulletin 25/18

8 November 2018

Fatalities are decreasing!

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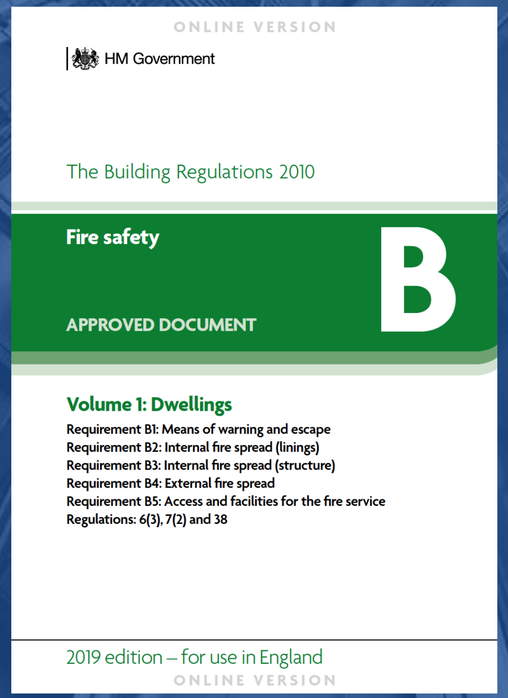
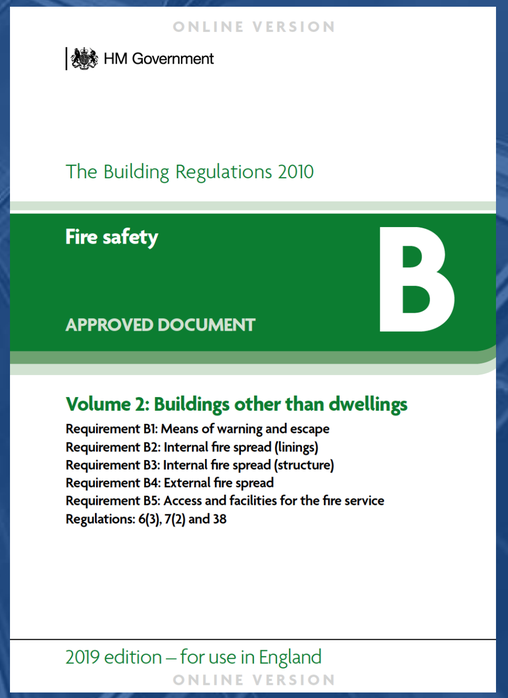
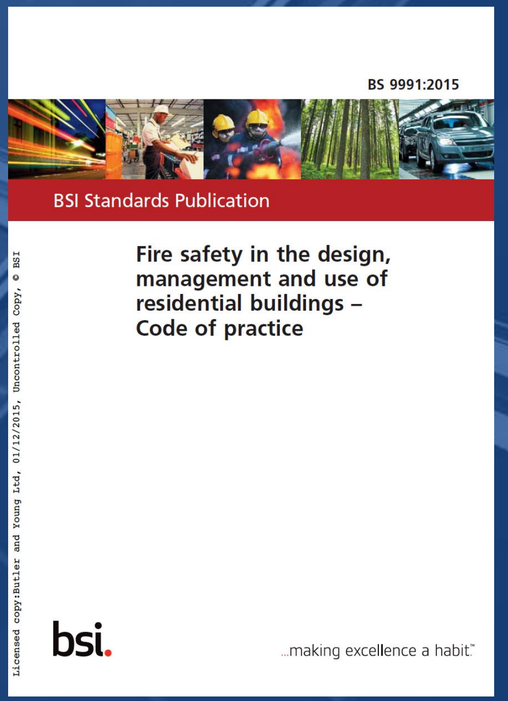
Guidance within the Approved Documents







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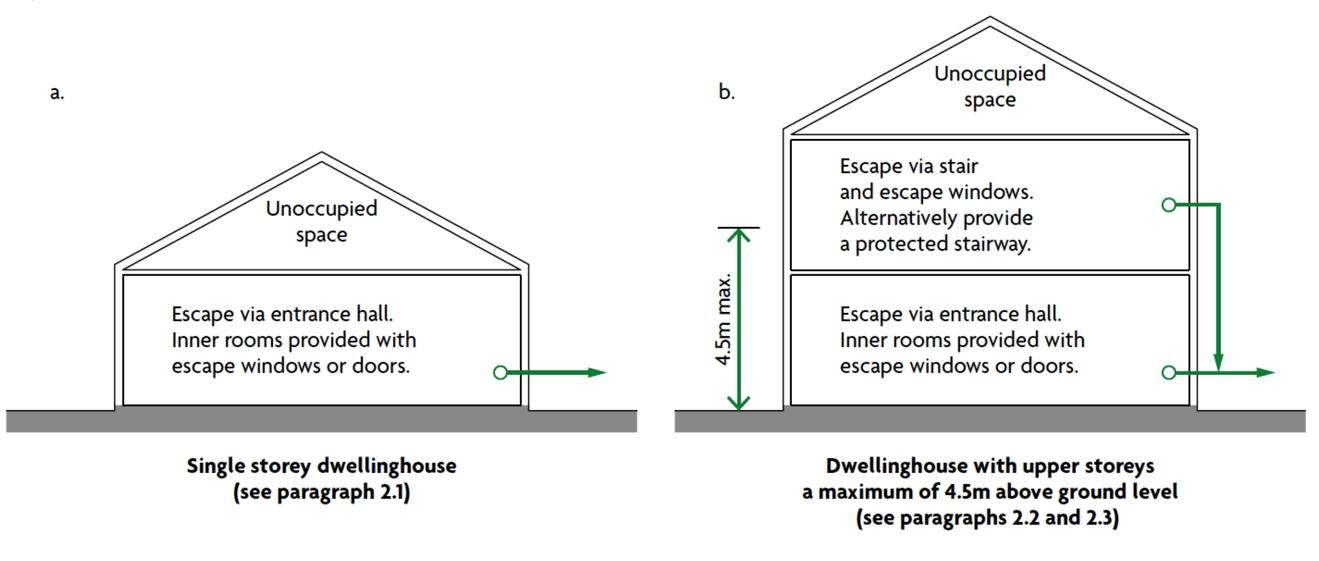
Code compliant Solutions

Floors less than 4.5m from ground level



Single storey dwellinghouse (see paragraph 2.1)

Dwellinghouse with upper storeys a maximum of 4.5m above ground level (see paragraphs 2.2 and 2.3)

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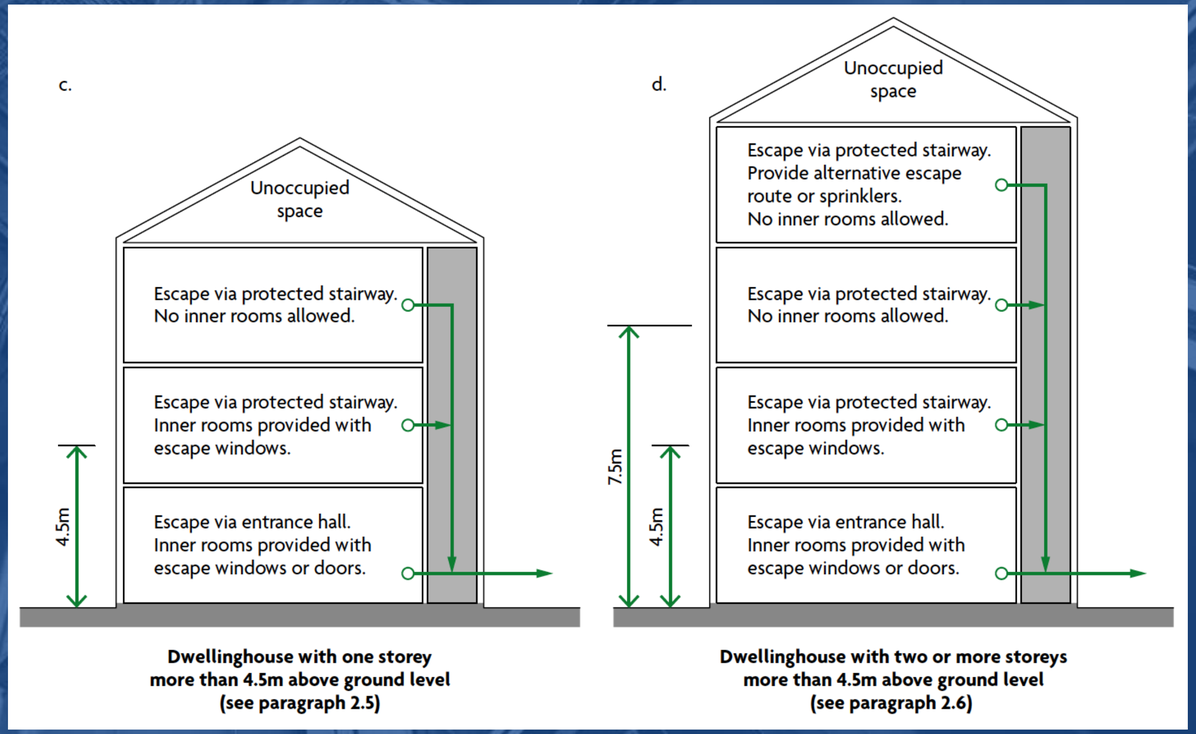
Code compliant Solutions – *Floors over 4.5m and 7.5m*



Dwellinghouse with one storey more than 4.5m above ground level (see paragraph 2.5)

Dwellinghouse with two or more storeys more than 4.5m above ground level (see paragraph 2.6)

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Code compliant Solutions

Escape Windows – Balconies?

Emergency escape windows and external doors

2.10 Windows or external doors providing emergency escape should comply with all of the following.

a. Windows should have an unobstructed openable area that complies with all of the following.

   i. A minimum area of 0.33m^2.

   ii. A minimum height of 450mm and a minimum width of 450mm (the route through the window may be at an angle rather than straight through).

   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 be capable of remaining open without being held.

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Code compliant Solutions – *Protected Stairs*

See para 2.5

a.

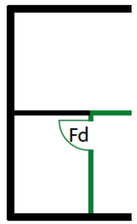

Diagram 2.2 A

See para 2.5

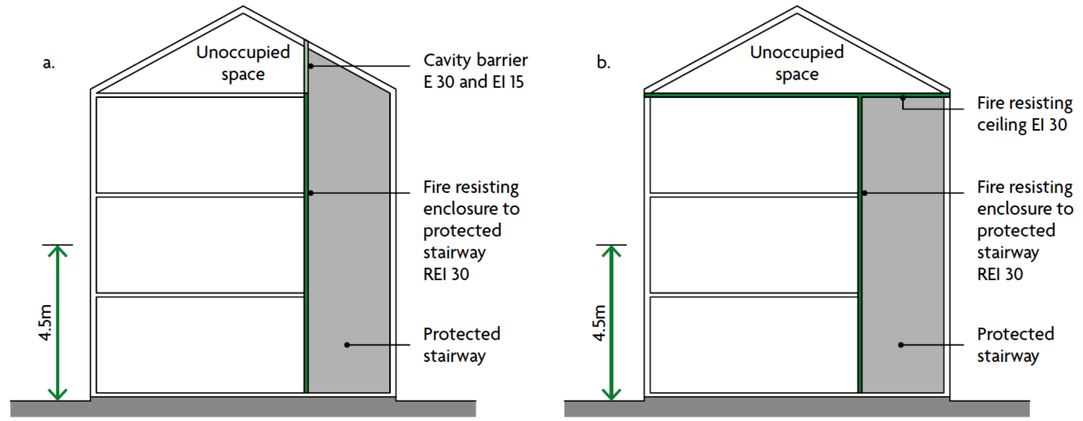

Diagram 2.3 Alternative cavity barrier arrangements in roof space over protected stairway in a house with a storey more than 4.5m above ground level

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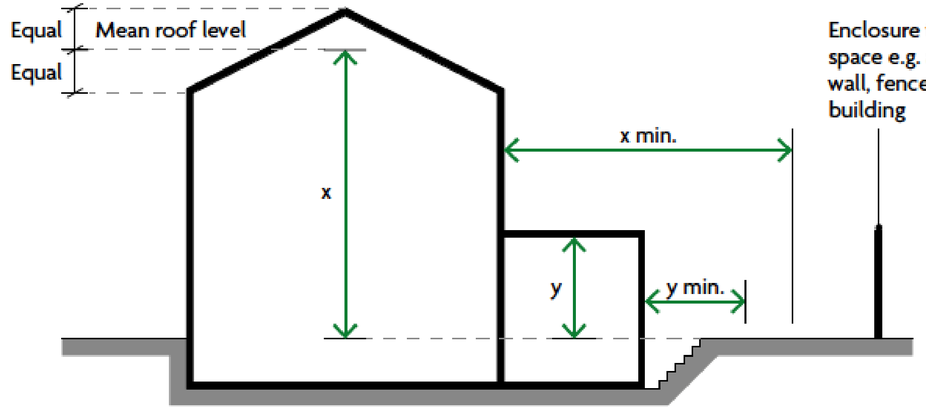
Code compliant Solutions – *Place of safety*

See para 2.10



Where escape from a dwellinghouse is to an enclosed space with exit only possible through other buildings (e.g. a courtyard or back garden), the length of the space should exceed whichever is the greater of the following.

a. The height of the dwellinghouse above ground level (x).

b. Where a rear extension is provided, the height of the extension (y).

Diagram 2.5 Ground or basement storey exit into an enclosed space

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Code compliant Solutions – *Basements*

Basements

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

a. An emergency escape window or external door providing escape from the basement (paragraph 2.10).

b. A protected stairway (paragraph 2.5a) leading from the basement to a final exit.

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Code compliant Solutions – *Galleries*

Galleries

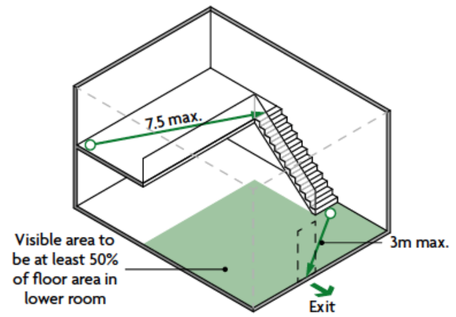
2.15 A gallery should comply with one of the following.

a. It should be provided with an alternative exit.

b. It should be provided with an emergency escape window, as described in paragraph 2.10, where the gallery floor is a maximum of 4.5m above ground level.

c. It should meet all the conditions shown in Diagram 2.6.

See para 2.15



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 escape 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. Be enclosed with fire resisting construction
   ii. Be remote from the stair to the gallery and positioned such that they do not prejudice escape from the gallery.

Diagram 2.6 Gallery floors with no alternative exit

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Code compliant Solutions – *Loft Conversions*

Loft conversions

2.21 Where a new storey is added through conversion to create a storey above 4.5m, both of the following should apply.

a. The full extent of the escape route should be addressed.

b. Fire resisting doors (minimum E 20) and partitions (minimum REI 30) should be provided, including upgrading the existing doors where necessary.

NOTE: Where the layout is open plan, new partitions should be provided to enclose the escape route (Diagram 2.2).

2.22 Where it is undesirable to replace existing doors because of historical or architectural merit, the possibility of retaining, and where necessary upgrading, them should be investigated.

2.23 An alternative approach to that described in paragraph 2.21 would be to comply with all of the following.

a. Provide sprinkler protection to the open-plan areas.

b. Provide a fire resisting partition (minimum REI 30) and door (minimum E 20) 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.

c. Separate cooking facilities from the open-plan area with fire resisting construction (minimum REI 30).

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Alternative Compliance options – *Loft Conversions*

BCA Technical Guidance Note 4 | Rev 1 Jan 2012

APPLICATION OF B1 TO LOFT CONVERSION WORKS & FIRE DOORS TO PROTECTED STAIRWAYS

Purpose

BCA technical guidance notes are for the benefit of it's members and the construction industry to provide information, promote good practice and encourage consistency of interpretation for the benefit of our clients. They are advisory in nature, and in all cases the responsibility for determining compliance with the Building Regulations remains with the building control body concerned.
This guidance note is based upon information available at the time of issue and may be subject to change. The Approved Documents should be consulted for full details in any particular case.

Introduction

This guidance is intended to provide an approach that aims to achieve the functional requirements of regulation B1 for loft conversions and applies to two storey single family unit houses that are converted to form 3 storeys, with a maximum of 2 habitable rooms and a floor area not more than 50m2 to the new 3rd storey level where only that floor is more than 4.5m above ground level.
In 2010 the Construction Products Association (CPA) published a detailed guidance document 'Loft Conversion Project Guide' to help the public; industry and Building Control Bodies (BCB) understand and comply with the Building Regulations. The guide was compiled with assistance from ACAI, LABC, NHBC, FMB and Energy Saving Trust with an endorsement from Andrew Stunell MP, Parliamentary Under-Secretary of State for Communities and Local Government. In recognition of this document this best practice note offers guidance on the use of fire alarm and detection systems as a possible alternative to the traditional solutions covered in Approved Document B. This best practice note is intended to provide guidance that will promote a consistent approach to applying the Building Regulations.

Key Issues

Floors

The new 2nd floor is in all solutions required to achieve 30 minutes fire resistance along with walls that separate any rooms from a circulation area such as a stairwell enclosure. Under certain circumstances the existing 1st floor may have a modified 30 minutes fire resistance where it separates only rooms and not circulation spaces (B3 4.7).

Doors

From experience it has been found that home owners will often wish to retain doors rather than replace them. This section offers some solutions to when it would or would not be acceptable to accept different types of doors. In general doors from rooms and cupboards opening on to the stairwell must be FD20 standard, but there is no requirement for them to be self closing. Any glazing in the doors must be of a 30 minutes fire resistant standard. An alternative to providing a fire door on a bathroom which cannot be entered through another room is to include the bathroom within the staircase enclosure by ensuring that the enclosing walls, floor and ceiling achieve the 30 minutes fire resisting standard. It should also be noted that it may not always be necessary to provide fire doors to certain cupboards if they are small and the fire risk is considered to be low. However, doors which separate a circulation space from an attached or integral garage are required to be FD30, be fitted with a self-closing device and incorporate adequate cold smoke seals.

Options for various doors include:

a) New door openings
These doors are to be minimum FD20 fire rated doors fixed in suitable fire frames.

b) Existing doors of historical or architectural merit
It may be possible to upgrade these doors to an acceptable fire resistant standard through the use of intumescent materials. A number of factors will affect this, including fit of door; quality of joints, glue and wood; type of hinges and hardware
b)

c) Existing panel doors in excess of 32mm thickness
The door should be attached to the door frame with steel hinges, not be visibly warped, fit well into its frame (4mm gap at head and sides maximum) and there should be no visible defects particularly in the panels. There should be no significant defects to adjacent walls or around door frames forming the stair enclosure.

d) Existing Panel doors less than 32mm in thickness
In addition to the recommendations for panel doors in excess of 32mm it will be necessary to upgrade this door type by

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Alternative Compliance options – *Odd ones!*

Alternative approaches

0.9 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 methods of complying with the Building Regulation requirements.

If alternative methods are adopted, the overall level of safety should not be lower than the approved document provides. It is the responsibility of those undertaking the work to demonstrate compliance.

If other standards or guidance documents are adopted, the relevant fire safety recommendations in those publications should be followed in their entirety. However, in some circumstances it may be necessary to use one publication to supplement another. Care must be taken when using supplementary guidance to ensure that an integrated approach is used in any one building.

Guidance documents intended specifically for assessing fire safety in existing buildings often include less onerous provisions than those for new buildings and are therefore unlikely to be appropriate for building work that is controlled by the Building Regulations.

Buildings for industrial and commercial activities that present a special fire hazard, e.g. those that sell fuels, may require additional fire precautions to those in this approved document.

3. Where very large (over 18m in height or with a 10m deep basement) or unusual dwellinghouses are proposed, some of the guidance for buildings other than dwellings may be needed.

provisions in this document may be appropriate. In such cases, it is appropriate to assess the hazard and risk in the particular case and consider a range of fire safety features in that context.

Sheltered housing

0.11 While many of the provisions in this approved document for means of escape from flats are applicable to sheltered housing, the nature of the occupancy may necessitate some additional fire protection measures. The extent of such measures will depend on the form of the development. For example, a group of specially adapted bungalows or two storey flats, with few communal facilities, will not need to be treated differently from other single storey or two storey dwellinghouses or flats.

Fire safety engineering

0.12 Fire safety engineering might provide an alternative approach to fire safety. Fire safety engineering may be the only practical way to achieve a satisfactory standard of fire safety in some complex buildings and in buildings that contain different uses.

Fire safety engineering may also be suitable for solving a specific problem with a design that otherwise follows the provisions in this document.

0.13 **BS 7974** and supporting published documents (PDs) provide a framework for and guidance on the application of fire safety engineering principles to the design of buildings.

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Fire Safety in Dwelling Houses

Fire Detection and Alarms Systems

+ water suppression systems

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Means of early warning – AD compliant

General provisions

1.1 All dwellings should have a fire detection and alarm system, minimum Grade D2 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**.

NOTE: The term 'fire alarm system' describes the combination of components for giving an audible and/or other perceptible warning of fire.

NOTE: In this document, the term 'fire detection system' describes any type of automatic sensor network and associated control and indicating equipment. Sensors may be sensitive to smoke, heat, gaseous combustion products or radiation. Automatic sprinkler systems can also be used to operate a fire alarm system.

Reference to BS 5839 Part 6

Grade D2 = mains powered with standby supply

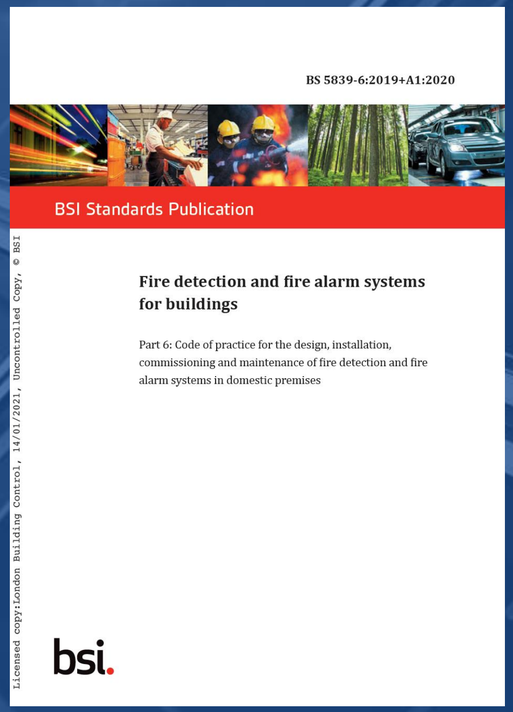
Category LD3 = Detectors in circulation spaces only

Large dwellinghouses

1.5 A large dwellinghouse has more than one storey, and at least one storey exceeds 200m².

1.6 A large dwellinghouse of two storeys (excluding basement storeys) should be fitted with a Grade A Category LD3 fire detection and alarm system, as described in **BS 5839-6**.

1.7 A large dwellinghouse 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**.



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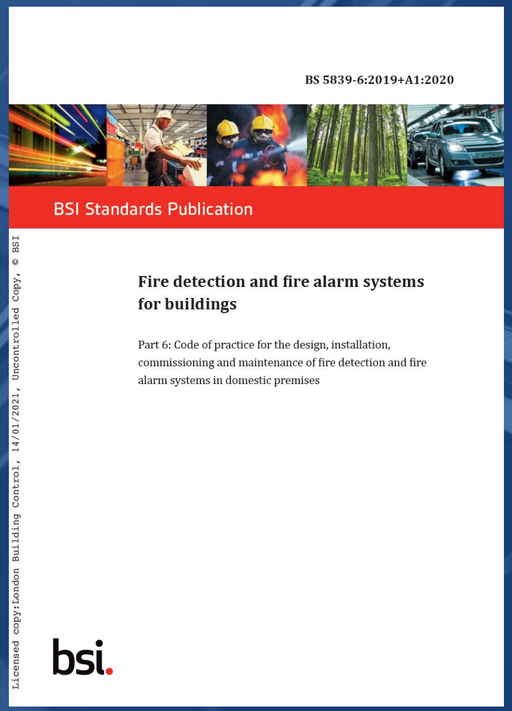
Enhanced Detection – Material Alterations

Will it make a difference that can be quantified/documented in some way?



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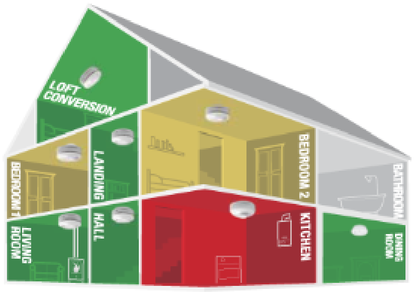
System Categories

Coverage and level of detection

LD1 – High Protection

- All areas where a fire could start, e.g.:
- Hallways
- Landings
- Living Room
- Kitchen
- Bedrooms
- Airing cupboards/ Meter cupboards



LD2 – Medium Protection

- Escape routes and high risk areas, e.g.:
- Hallways
- Landings
- Living Room
- Kitchen

LD3 – Minimum Protection

- Escape routes, e.g.:
- Hallways
- Landings

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System Grades

Grade relates to the engineering components of the system. It's about reliability and availability!

The grades are defined as follows.

- *Grade A: A fire detection and fire alarm system, which incorporates CIE conforming to BS EN 54-2 and power supply equipment conforming to BS EN 54-4, and which is designed and installed in accordance with all the recommendations of BS 5839-1:2017, Section **1** to Section **4** inclusive, except those in the following clauses, for which the corresponding clauses of this part of BS 5839 need to be substituted.*

- *Grade C: A system of fire detectors and alarm sounders (which may be combined in the form of smoke alarms) connected to a common power supply, comprising the normal mains and a standby supply, with central control equipment.*
- *Grade D1: A system of one or more mains-powered detectors (see 3.12), each with a tamper-proof standby supply consisting of a battery or batteries (see 3.62).*
- *Grade D2: A system of one or more mains-powered detectors (see 3.12), each with an integral standby supply consisting of a user-replaceable battery or batteries.*

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Sprinkler design to BS 9251

- *Mains water supply*
- *Pipework can be of plastic material*
- *Installation certified*

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Water-mist Design to BS 8458

An alternative to sprinklers. Requires specialist design to the standard or demonstrate equivalency to sprinklers

- *High pressure cylinders/pumps*
- *Nozzle differences*
- *Installation certified*

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Fire Safety in Dwelling Houses

Fire spread

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B3 – Internal Fire Spread

Requirement

Requirement	*Limits on application*
Internal fire spread (structure)	
B3. (1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period	
(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.	
(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—	Requirement B3(3) does not apply to material alterations to any prison provided under section 33 of the Prison Act 1952.
(a) sub-division of the building with fire-resisting construction;	
(b) installation of suitable automatic fire suppression systems.	
(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.	

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B3 – Internal Fire Spread

- *Elements of structure*
- *Compartment Walls*
- *Garages (other uses)*
- *Voids and Cavities*

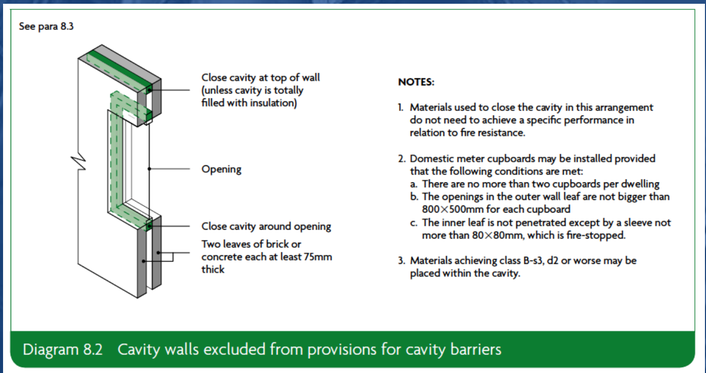

Diagram 8.2 Cavity walls excluded from provisions for cavity barriers

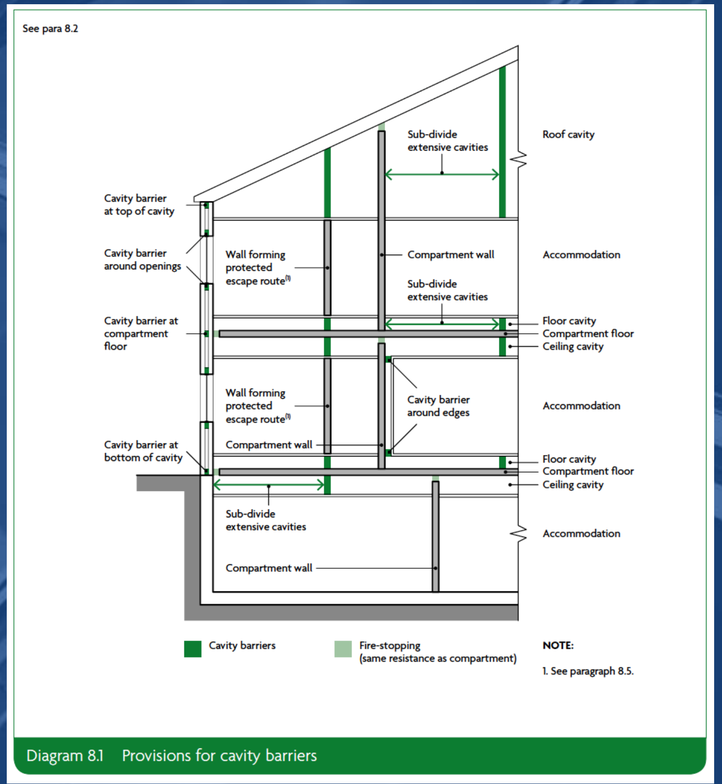

Diagram 8.1 Provisions for cavity barriers

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B4 – External Fire Spread – Buildings below 18m!

Requirement

Requirement

External fire spread

B4. (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.

(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.

Limits on application

Regulation

Regulation 7 – Materials and workmanship

(1) Building work shall be carried out—

(a) with adequate and proper materials which—

(i) are appropriate for the circumstances in which they are used,

(ii) are adequately mixed or prepared, and

(iii) are applied, used or fixed so as adequately to perform the functions for which they are designed; and

(b) in a workmanlike manner.

(2) Subject to paragraph (3), building work shall be carried out so that materials which become part of an external wall, or specified attachment, of a relevant building are of European Classification A2-s1, d0 or A1, classified in accordance with BS EN 13501-1:2007+A1:2009 entitled "Fire classification of construction products and building elements. Classification using test data from reaction to fire tests" (ISBN 978 0 580 59861 6) published by the British Standards Institution on 30th March 2007 and amended in November 2009.

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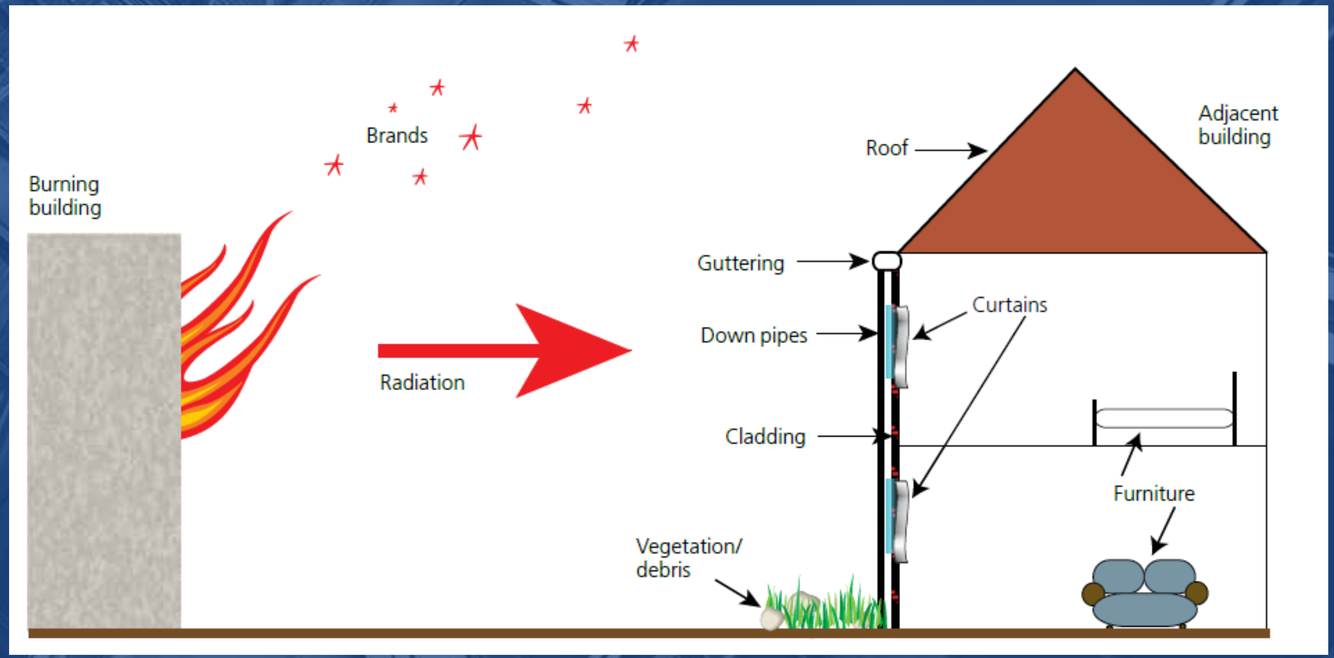
B4 – External Fire Spread Basic Principles



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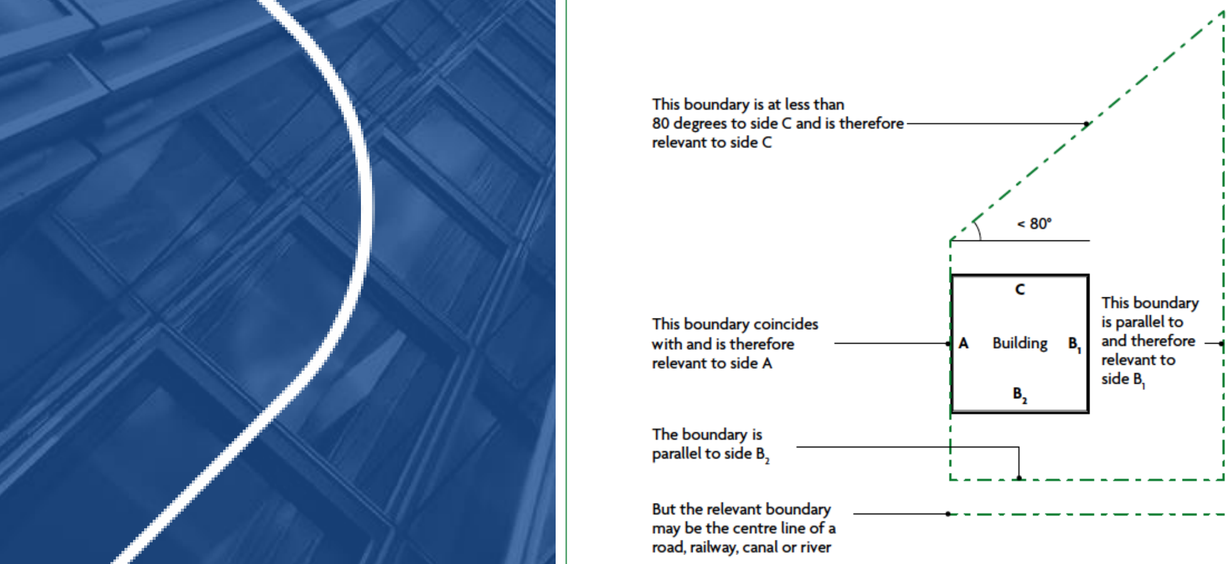
B4 – External Fire Spread

See para 11.5



NOTES:

This diagram sets out the rules that apply in respect of a boundary for it to be considered as a relevant boundary.

For a boundary to be relevant it should comply with one of the following:

a. Coincide with the side of the building (**A**).
b. Be parallel to the side of the building (**B_1** or **B_2**).
c. Be at an angle of maximum 80 degrees to the side of the building (**C**).

Diagram 11.2 Relevant boundary

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B4 – External Fire Spread

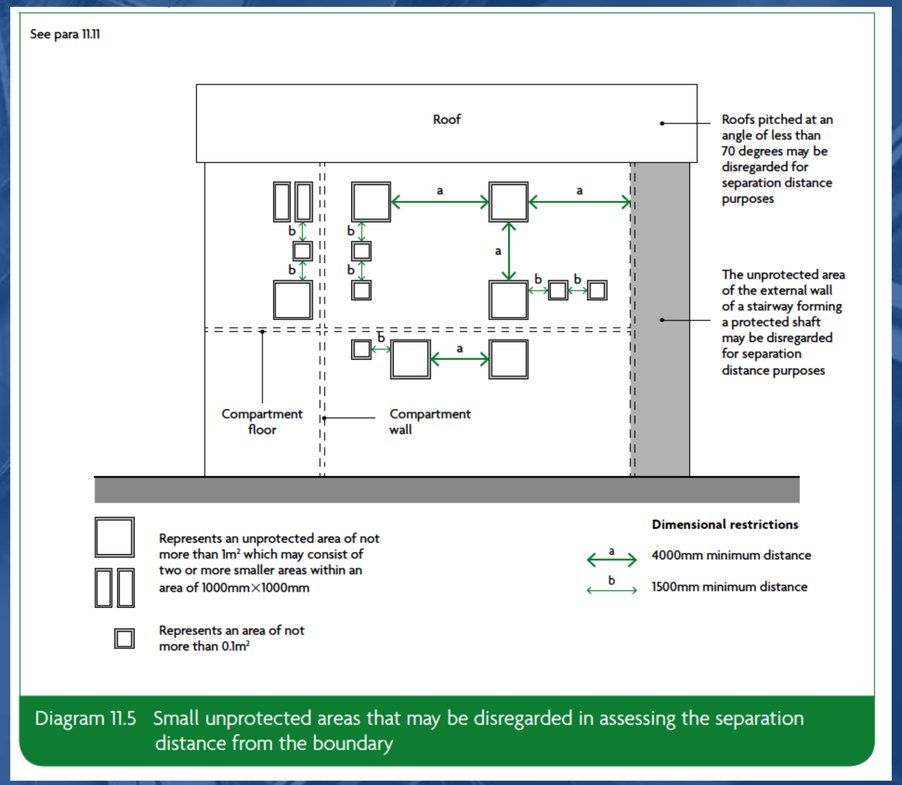

Diagram 11.5 Small unprotected areas that may be disregarded in assessing the separation distance from the boundary

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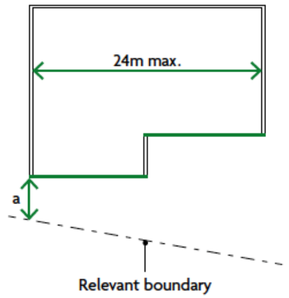
B4 – External Fire Spread – Unprotected area methods

Method 1

11.17 This method applies to small buildings intended to be used for blocks of flats or dwellinghouses.

11.18 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 11.7. Any small unprotected areas falling within the limits shown in Diagram 11.5 can be ignored.

See para 11.18



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

Diagram 11.7 Permitted unprotected areas in small residential buildings

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B4 – External Fire Spread – Wall finishes (cladding)

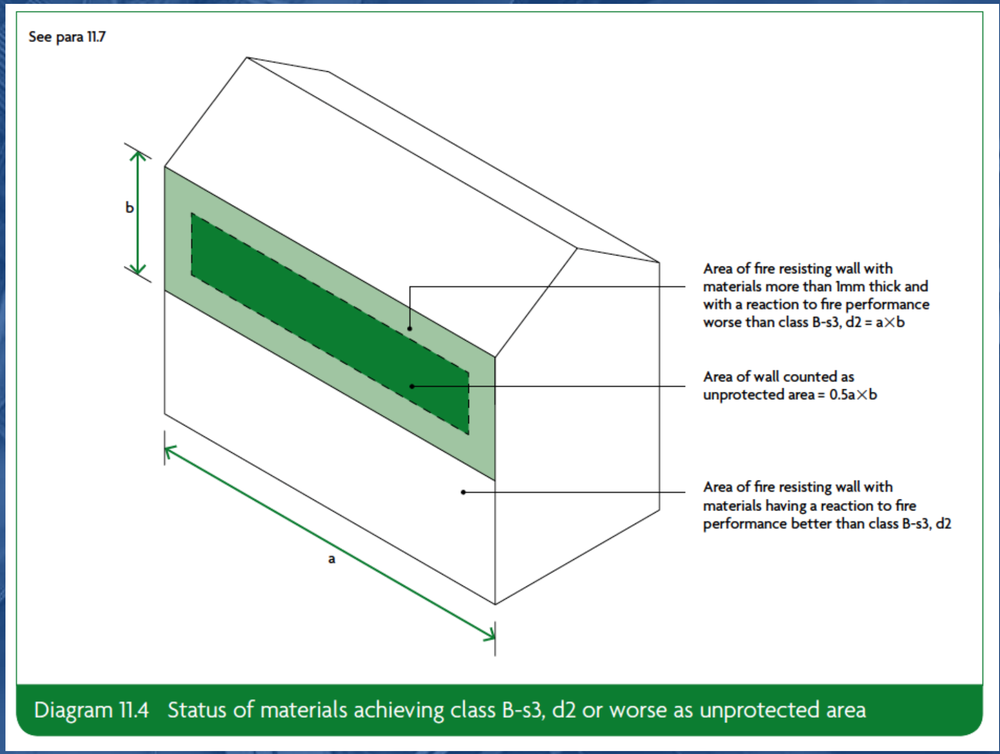

Diagram 11.4 Status of materials achieving class B-s3, d2 or worse as unprotected area

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Access & Facilities for the Fire Service

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B5 – Access and facilities for the fire service

Requirement

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

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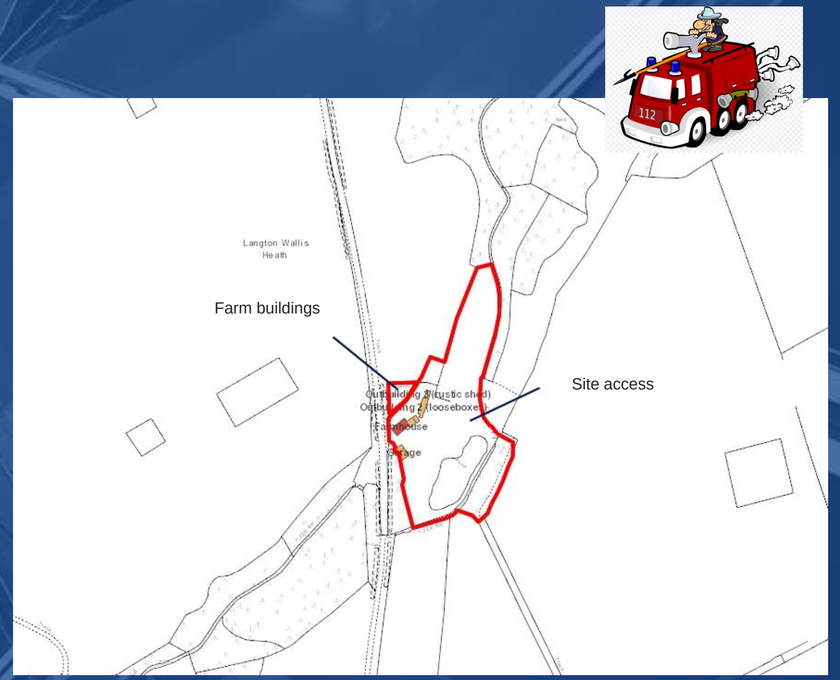
B5 – Access and facilities for the fire service

Some details to consider:

- *Distance to furthest point in dwelling (45m)*
- *Suitable road surface*
- *Road/Gate widths*
- *Reversing distance or turning circles*
- *Water supplies (?)*



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