

B

Fire Safety

Dwelling Houses

Volume 2

**Building
Regulations
2017**

**Technical
Guidance
Document**



**An Roinn Tithíochta, Pleanála,
Pobail agus Rialtais Áitiúil**
Department of Housing, Planning,
Community and Local Government



Building Regulations 2017

Technical Guidance Document B

Fire Safety – Volume 2 – Dwelling Houses

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Building Regulations 2017

Technical Guidance Document B

Fire Safety – Volume 2 – Dwelling Houses

Introduction

This document has been published by the Minister for Housing, Planning, Community and Local Government, under Article 7 of the Building Regulations, 1997-2017. It provides guidance in relation to Part B of the Second Schedule to the Regulations, as amended relating to dwelling houses.

In general, Building Regulations apply to the construction of new buildings and to extensions and material alterations to buildings. In addition, certain parts of the Regulations apply to existing buildings where a material change of use takes place. Otherwise, Building Regulations do not apply to buildings constructed prior to 1 June 1992.

Transitional Arrangements

In general, this document applies to works to dwelling houses, or buildings in which a material change of use takes place, where the works or the change of use commence or takes place, as the case may be on or after 1 July 2017. The guidance given in Technical Guidance Document B – Fire Safety, dated 2006 relating to dwelling houses, will cease to have effect from that date. However, the latter document may continue to be used in the case of works, or buildings in which a material change of use takes place, where the works, material alteration or the change of use commence or takes place, as the case may be, on or before 30 June 2017.

The Guidance

The materials, methods of construction, standards and other specifications (including technical specifications) which are referred to in this document are those which are likely to be suitable for the purposes of the Regulations. Where works are carried out in accordance with the guidance in this document, this will, prima facie, indicate compliance with Part B of the Second Schedule of the Building Regulations.

However, the adoption of an approach other than that outlined in the guidance is not precluded provided that the relevant requirements of the Regulations are complied with. Those involved in the design and construction of a building may be required by the relevant building control authority to provide such evidence as is necessary to establish that the requirements of the Building Regulations have been complied with.

Existing Buildings

In the case of material alterations or changes of use of existing buildings, the adoption of the guidance in this document without modification may not, in all circumstances, be appropriate. In particular, the adherence to guidance including codes, standards or technical specifications, intended for application to new work may be unduly restrictive or impracticable. Buildings of architectural or historical interest are especially likely to give rise to such circumstances. In these situations, alternative approaches based on the principles contained in the document may be more relevant and should be considered.

Technical Specifications

Building Regulations are made for specific purposes, e.g. to provide, in relation to buildings, for the health, safety and welfare of persons, the conservation of energy and access for people with disabilities. Technical specifications (including harmonised European Standards, European Technical Assessments, National Standards and Agrément Certificates) are relevant to the extent that they relate to these considerations. Any reference to a technical specification is a reference to so much of the specification as is relevant in the context in which it arises. Technical specifications may also address other aspects not covered by the Regulations.

A reference to a technical specification is to the latest edition (including any amendments,

supplements or addenda) current at the date of publication of this Technical Guidance Document. However, if this version of the technical specification is subsequently revised or updated by the issuing body, the new version may be used as a source of guidance provided that it continues to address the relevant requirements of the Regulations.

Materials and Workmanship

Under Part D of the Second Schedule to the Building Regulations, works to which the Regulations apply must be carried out with proper materials and in a workmanlike manner. Guidance in relation to compliance with these requirements is contained in Technical Guidance Document D.

Interpretation

In this document, a reference to a section, sub-section, part, paragraph or diagram is, unless otherwise stated, a reference to a section, sub-section, part, paragraph or diagram, as the case may be, of this document. A reference to another Technical Guidance Document is a reference to the latest edition of a document published by the Minister for Housing, Planning, Community and Local Government under article 7 of the Building Regulations, 1997. Diagrams are used in this document to illustrate particular aspects of construction - they may not show all the details of construction.

Fire Safety – Volume 2 - Dwelling Houses

Building Regulations – The Requirement

Part B – The Requirement

Part B6-B11 of the Second Schedule to the Building Regulations, 2017 provides for Dwelling Houses as follows:

Means of warning and escape in case of fire.	B6	A dwelling house shall be so designed and constructed that there are appropriate provisions for the early warning of fire and there are adequate means of escape in case of fire from the dwelling house to a place of safety outside the building, capable of being safely and effectively used.
Internal fire spread (linings).	B7	<p>For the purpose of inhibiting the spread of fire within a dwelling house, the internal linings:</p> <p>(a) shall have, either a rate of heat release or a rate of fire growth and a resistance to ignition which is reasonable in the circumstances; and</p> <p>(b) shall offer adequate resistance to the spread of flame over their surfaces.</p>
Internal fire spread (structure).	B8	<p>(1) A dwelling house shall be so designed and constructed that, in the event of fire, its stability will be maintained for a reasonable period.</p> <p>(2) (a) A wall common to a dwelling house and to one or more adjoining buildings shall be so designed and constructed that it offers adequate resistance to the spread of fire between those buildings.</p> <p>(b) A dwelling house shall be sub-divided with fire resisting construction where this is necessary to inhibit the spread of fire within the dwelling house.</p> <p>(3) A dwelling house shall be so designed and constructed that the unseen spread of fire and smoke within concealed spaces in its structure or fabric is inhibited where necessary.</p> <p>(4) For the purposes of sub-paragraph 2(a), a dwelling house in a terrace and a semi-detached dwelling house are each to be treated as being a separate building.</p>
External fire spread.	B9	The external walls and roof of a dwelling house shall be so designed and constructed that they afford adequate resistance to the spread of fire to and from neighbouring buildings.
Access and facilities for the fire service.	B10	A dwelling house shall be so designed and constructed that there is adequate provision for access for fire appliances and such other facilities as may be reasonably required to assist the fire service in the protection of life and property.
Definitions for this Part.	B11	In this Part - “dwelling house” means a dwelling that is not a flat.

Section 0

General guidance

0.1 Use of the Guidance

0.1.1 Fire Safety objectives

Building Regulations are made for specific purposes. Part B of the Second Schedule to the Building Regulations is therefore primarily concerned with the health, safety and welfare of persons. The fire safety measures outlined in this guidance document are intended for the protection of life from fire.

0.1.2 Technical Guidance Document B-Fire safety (TGD B) is published in **two volumes**.

Volume 1, deals with all other types of buildings covered by the Building Regulations excluding dwelling houses.

Volume 2, deals solely with dwelling houses. Volume 2 gives guidance which relates to non-complex dwelling houses of normal design and construction and timber frame to I.S 440. Where very large or unusual dwelling houses (over 15m in height), are proposed, or where an alternative approach is required, some of the guidance in Volume 1 may be needed to supplement that given by Volume 2.

0.1.3 Application of Part B

Part B of the Second Schedule to the Building Regulations is primarily concerned with securing the health, safety and welfare of persons in or about buildings. This volume deals with the requirements of B6 - B10 relating to dwelling houses:

B6 aims to ensure that a satisfactory standard of early warning and means of escape is provided for persons in the event of fire in a dwelling house;

B7 aims to ensure that fire spread over the internal linings of dwelling houses is inhibited;

B8 aims to ensure the stability of dwelling houses in the event of fire, that there is a sufficient degree of fire separation within

dwelling houses and between adjoining buildings, (including dwelling houses) and to inhibit the unseen spread of fire and smoke in concealed spaces in dwelling houses;

B9 aims to ensure that external walls and roofs have adequate resistance to the spread of fire over their external surfaces, and that spread of fire from one building to another is restricted; and

B10 aims to ensure satisfactory access for fire appliances to dwelling houses and appropriate facilities in dwelling houses to assist fire fighters in the protection of life and property.

0.1.4 Arrangements of Sections

The provisions set out in Sections 1 to 5 of this Document, deal with the five Requirements of the Building Regulations as outlined above. The five sections, in addition to this one dealing with general provisions, are:

- S1 Means of warning and escape in case of fire
- S2 Internal Fire Spread (linings)
- S3 Internal Fire Spread (structure)
- S4 External Fire Spread
- S5 Access and Facilities for the Fire Service

0.1.5 Purpose Groups

Many of the provisions in this Document are related to the use of the building. The use classifications are termed purpose groups and from this it follows that the relevant purpose group should be decided before the provisions can be determined.

The provisions in this Document are related to the purpose groups outlined in Table 0.1

Table 0.1 Classification of buildings by purpose group <i>Par.0.1.5</i>		
Use	Group	Purpose for which a building or compartment of a building is used
Residential (Dwellings)	1(a) ⁽¹⁾⁽²⁾	Dwelling house with no storey with a floor level which is more than 4.5m above ground level.
	1(b) ⁽¹⁾⁽²⁾	Dwelling house with a storey with a floor level which is more than 4.5 m above ground level.
	1(d) ⁽²⁾	Community Dwelling house with a maximum of 8 bedrooms which may have no more than one storey, the floor level of which is more than 4.5m above ground level

Note 1

Purpose Groups 1(a) and 1(b) include:

- any surgery, consulting rooms, office or other (professional rooms) accommodation not exceeding 50m² forming part of a dwelling house and used by the occupant of the dwelling house in a professional capacity.

Note 2

Purpose Groups 1(a) ,1(b) and 1(d) include:

- a domestic garage within the envelope of the dwelling house.

0.1.6 Interaction of Provisions

Whilst provisions appropriate to B6 to B10 are set out separately in Sections 1 to 5 in this Document, many of the provisions are closely interlinked. For example, there is a close link between the provisions for means of escape (S1) and those for the control of fire growth (S2), fire containment (S3), and facilities for the fire service (S5). Similarly there are links between S3 and the provisions for controlling external fire spread (S4), and between S3 and S5.

Interaction between these different requirements should be recognised where variations in the standard of provision are being considered. A higher standard under one of the requirements may be of benefit in respect of one or more of the other requirements. Thus the provisions in the Document as a whole should be considered as a package aimed at achieving an acceptable standard of fire safety.

0.1.7 Performance Statements

At the start of Sections S1 to S5, the relevant requirement of the Regulations is set out and is followed by a performance statement which indicates how the requirement may be met. These statements incorporate the essential elements required to satisfy the regulations and form the basis for the provisions contained in the guidance.

0.1.8 Alternative Solutions

The detailed provisions set out in this Document are intended to provide guidance for some of the more common building situations. In other situations, alternative ways of achieving compliance with the requirements of Part B of the Second Schedule to the Building Regulations may be appropriate. There is no obligation to adopt any particular solution contained herein. The use of alternative design solutions, standards, systems or methods of fire protection to those outlined in this document are

acceptable, provided the level of fire safety achieved is adequate to satisfy the requirements of the Building Regulations.

0.1.9 Existing Buildings

In the case of an existing building there may be constraints that would not exist with a new building and some variation of the provisions set out in this Document may be appropriate. Alternative solutions whether applied to all or part of the building or to specific provisions, may be employed in these situations. Also note that exceptions are allowed in 1.3.8 in relation to existing internal stairways.

Many fire safety provisions are inter-dependent and should not be considered in isolation. Where a particular provision outlined in this Document cannot be practicably achieved, account may be taken of compensating fire safety measures, depending on the nature and circumstances of each particular case.

Such measures would include active and / or passive provisions. Active provisions are those which come into action on detection of fire (such as fire suppression systems) while passive provisions relate to the defence against fire provided by the fabric and construction of a building (such as floors and walls).

Further guidance on effective and feasible recommendations and selection criteria for the use of passive fire protection (PFP) systems in buildings is given in "Ensuring best practice for passive fire protection in buildings" published by the Association of Specialist Fire Protection (ASFP).

A number of useful publications are available which outline alternative approaches to fire safety in existing buildings of special or historic merit. These include:

- Architectural Heritage Protection Guidelines for Planning Authorities Chapter 7 and Chapter 17 published by the DAHG 2011;

- Fire protection in old buildings and historic town centers, published by the Fire Protection Association;
- Fire protection measures for the Royal Palaces, Department of National Heritage, London; and
- Heritage under fire, a guide to the protection of historic buildings by the United Kingdom Working Party on Fire Safety in historic buildings.
- Guide for Practitioners 6: Conversion of Traditional Buildings by Historic Scotland www.historicscotland.gov.uk

0.1.10 Operation, maintain and use.

Sufficient clear and comprehensive information on any continuing maintenance should be provided to the owner where a Fire Detection and Alarm System (FDAS) or a fire suppression system is installed in the dwelling house.

0.1.11 Fire Performance of Materials and Structures: Appendix A

Many of the provisions throughout this publication are given in terms of performance in relation to standard fire test methods. Details are drawn together in Appendix A and reference is made where appropriate in Sections 1 to 5.

0.1.12 Fire Doors: Appendix B

Provisions in respect of fire doors are set out in Appendix B. Fire doors may play a significant part in the fire safety of some dwelling house. It is important to note that a fire door refers to a complete door assembly and not the door leaf alone.

0.1.13 Methods of measurement: Appendix C

Some form of measurement is an integral part of many of the provisions in this publication, and methods of measurement are set out in Appendix C

0.1.14 Loft Conversions: Appendix D

Provision in respect of Loft conversions in existing one and two storey dwellings are set out in Appendix D.

0.1.15 Referenced Standards and Publications

For convenience standards and publications are referenced after the Appendices in this Document

0.1.16 Independent schemes of Certification

Third party certification installers of systems, materials, products or structures can provide a means of ensuring that installations have been conducted by competent contractors to appropriate standards, thereby increasing the reliability of the anticipated performance in fire. (See Technical Guidance Document D – Materials and Workmanship)

0.1.17 Definitions

For the purposes of this document, the following terms and definitions apply.

These definitions are additional to those to be found in TGD Part B: Volume 1: Buildings other than dwelling houses

Access room - Room through which passes the only escape route from an inner room.

Appliance ventilation duct - A duct provided to convey combustion air to an appliance.

Access level - A level used for normal access to a building that either incorporates, or leads directly to, a place of safety.

Alternative escape routes - Escape routes sufficiently separated by either direction and space, or by fire-resisting construction, to ensure that one is still available should the other be affected by fire.

Basement storey - means a storey which is below the ground storey or, where there is

no ground storey, means a storey the top surface of the floor of which is situated at such a level or levels that some point on its perimeter is more than 1.2 m below the level of the finished surface of the ground adjoining the building in the vicinity of that point.

Bedroom - A room within a dwelling or building which is used as sleeping accommodation.

Boundary - The boundary of the land belonging to the building, or where the land abuts a road, railway, canal or river, the centreline of that road, railway, canal or river (see Diagram15).

Conservatory - A single storey part of a building where the roof and walls are substantially glazed with a transparent or translucent material.

Cavity barrier - A construction provided to close a concealed space against penetration of smoke or flame, or provided to restrict the movement of smoke or flame within such a space.

Ceiling-A part of a building which encloses and is exposed overhead in a room or circulation space (the soffit of a rooflight is included as part of its surface but not the frame).

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- see appendix A A12

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

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

Compartment wall or floor - A fire-resisting wall/floor used in the separation of one fire compartment from another (constructional requirements are given in 3.5 of Section 3).

Dead-end -Area from which escape is possible in one direction only.

Domestic Garage- means a building ancillary to a dwelling which is used, or suitable for use, for the storage of a motor vehicle or vehicles and is not used for the purposes of any trade or business.

Dwelling – A house or flat, forming a separate unit of residential accommodation.

Dwelling House – means a dwelling that is not a flat (as defined in S.I.497 of 1997).

Community Dwelling house - A Dwelling house with a maximum of 8 bedrooms which may have no more than one storey, the floor level of which is more than 4.5m above ground level occupied as a group home, under the management of a statutory or voluntary organization providing supported living and residential services.

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

Electro-magnetic, or electro-mechanical device susceptible to smoke - A device which will allow a door held open by it to close automatically in the event of each or any one of the following:

- (a) detection of smoke by automatic apparatus suitable in nature, quality and location, and
- (b) operation of a manually operated switch fitted in a suitable position, and
- (c) failure of the electricity supply to the device, apparatus or switch, and
- (d) operation of the fire alarm system, if any.

Escape route - A route by which a person may reach a place of safety, and, in relation to any point in a building, a route from that point to a place of safety.

External wall - (or side of a building for the purposes of B9) includes a part of a roof pitched at an angle of 70° or more to the horizontal - if that part of the roof adjoins a space within the building to which persons have access (but not access only for repair or maintenance).

Final exit - The termination of an escape route from a building giving direct access to a street, passageway, walkway or open space, and sited to ensure the rapid dispersal of persons from the vicinity of a building so that they are no longer in danger from fire and/or smoke.

Fire door - A door or shutter, provided for the passage of persons, air or objects, which together with its frame and furniture as installed in a building is intended when closed to resist the passage of fire and/or gaseous products of combustion, and is capable of meeting specified performance criteria to those ends. (It may have one or more leaves and includes a cover or other form of protection to an opening in a fire-resisting wall or floor, or in a structure surrounding a protected shaft).

Fire Stop – A seal provided to close an imperfection of fit or design tolerance

between elements or components, to restrict or prevent the passage of fire and smoke

Flat –separate and self-contained premises constructed or adapted for residential use and forming part of a building from some other part of which it is divided horizontally.

Floor area - In relation to a building means the area bounded by the inner finished surfaces of the enclosing walls, or, on any side where there is no enclosing wall, by the outermost edge of the floor on that side and in calculating the area of a building or part of a building there shall be included in such area the space occupied by any walls, shafts, ducts or structure within the area being measured (see Diagram C1 of Appendix C)

Gallery - Is a floor or storey which consists of a raised area or platform which projects into the space of the room, providing extra floor area.

Habitable room - A room used for living or sleeping purposes but does not include a kitchen having a floor area less than 6.5 m², a bathroom, toilet or shower room.

Hydrant - an assembly comprising a valve and outlet connection from an external fire mains, provided to deliver a supply of water for fire-fighting.

Height (of a building or storey) - (or of part of a building which is completely separated throughout, both below and above ground, by a compartment wall or compartment walls in the same continuous vertical plane) means the height of such building or part measured from the mean level of the ground adjoining the outside of the external wall of the building to the level of half the vertical height of the roof of the building or part, or to the top of the walls or of the parapet (if any), whichever is the higher (see Diagram C5 of Appendix C).

Inner room - A room from which escape is possible only by passing through an access room.

Means of escape - Physical means where by a safe route or routes is or are provided for persons to travel from any point in a building to a place of safety.

Measurement - (For area, cubic capacity, height of a building and number of storeys) - See Appendix C, Diagrams C1 to C5.

Notional boundary - A boundary presumed to exist between buildings on the same site (see Diagram 14).

Place of Safety - A place, normally in the open air at ground level, in which persons are in no danger from fire.

Pipe - Includes pipe fittings and accessories: excludes: a flue pipe and a pipe used for ventilating purposes (other than a ventilating pipe for an above ground drainage system).

Protected corridor/lobby- A corridor or lobby which is adequately protected from fire in adjoining accommodation by fire-resisting construction.

Protected stairway - A stairway which is adequately protected from fire in the accommodation through which it passes by fire-resisting construction and discharges through a final exit to a place of safety.

Relevant boundary - The boundary which the side of the building faces (see Diagram 15). A notional boundary can be a relevant boundary.

Rooflight - Any domelight, lantern light, skylight or other element intended to admit daylight through a roof.

Storey-means any of the parts into which a

dwelling house is divided horizontally above or below ground level including a gallery, but excluding any part of a dwelling house situated above the level of the roof space which has not been adapted to be used for habitable purposes.

Thermo-plastic material - See Appendix A, paragraph A16.

Unprotected area - In relation to a side or external wall of a building means:

- (a) a window, door or other opening; and
- (b) any part of the external wall which has less than the relevant fire resistance set out in Section 4.4; and
- (c) any part of the external wall which has combustible material more than 1 mm thick attached or applied to its external face, whether for cladding or any other purpose (combustible material in this context is any material that is not included in Tables A6 or A7 in Appendix A).

Wall - (for the purpose of S4) includes:

- (i) the surface of glazing (except glazing in doors), and
- (ii) any part of a ceiling which slopes at an angle of 70° or more to the horizontal.

but a wall excludes (for the purpose of S4):

- (i) doors and door frames;
- (ii) window frames and frames in which glazing is fitted;
- (iii) architraves, cover moulds, picture rails, skirtings and similar narrow members; and
- (iv) fireplace surrounds, mantle-shelves and fitted furniture.

Section 1

Means of warning and escape in case of fire

Means of warning and escape in case of fire.	B6	A dwelling house shall be so designed and constructed that there are appropriate provisions for the early warning of fire and there are adequate means of escape in case of fire from the dwelling house to a place of safety outside the building, capable of being safely and effectively used.
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1.1 Means of warning and escape in case of fire

1.1.1 General

The purpose of the requirement of Regulation B6 is to ensure that adequate early warning of fire is provided and a satisfactory standard of means of escape is provided for persons in the event of fire in a building.

1.2 Performance

The requirement of B6 may be met:

- (a) If there is a route or routes of sufficient size, which are suitably located to enable persons to escape to a place of safety in the event of fire;
- (b) If the routes are sufficiently protected from the effects of fire in terms of enclosure, where necessary, and in the use of materials on the routes; and
- (c) If an alarm system to warn the occupants of the existence of fire is provided to enable them to use the routes safely.

all to an extent necessary that is dependent on the use of the building, its size and height.

1.3 Dwelling Houses

1.3.1 Introduction

This section deals with the means of escape provisions in Dwelling houses (Purpose Groups 1(a), 1(b) and 1(d) in Table 0.1).

Note: The means of escape provisions for Residential (Dwellings), flats and maisonettes (Purpose Group 1(c)) are contained in TGD B Volume 1: Buildings other than Dwelling Houses.

Dwelling houses will generally have a single escape stairway and there is a risk that this may become unusable due to smoke. Protection/enclosure to the stairway is required, to an extent which varies with the number of storeys above the ground level. Windows, if suitably located and constructed, can in some situations provide an alternative means of escape. With increasing height, windows become unsuitable for escape but may be useful for rescue purposes.

The means of escape provisions for dwelling houses are outlined in 1.3.2 -1.3.5.and 1.3.9 contains general provisions for dwelling houses. Appendix D deals with loft conversions in existing dwelling houses.

Early warning of fire can be achieved by the provision of an appropriate smoke detection and alarm system. Guidance on an appropriate system for dwellings is outlined in 1.3.6

1.3.2 Dwelling Houses with no Floors more than 4.5 m above ground level (Purpose Group 1(a))

The following provisions apply to dwelling houses where the height of the top storey is not more than 4.5 m (see Diagram 3(a) or 3(b) and Appendix C, Diagram C4).

This type of dwelling house typically has one or two storeys:

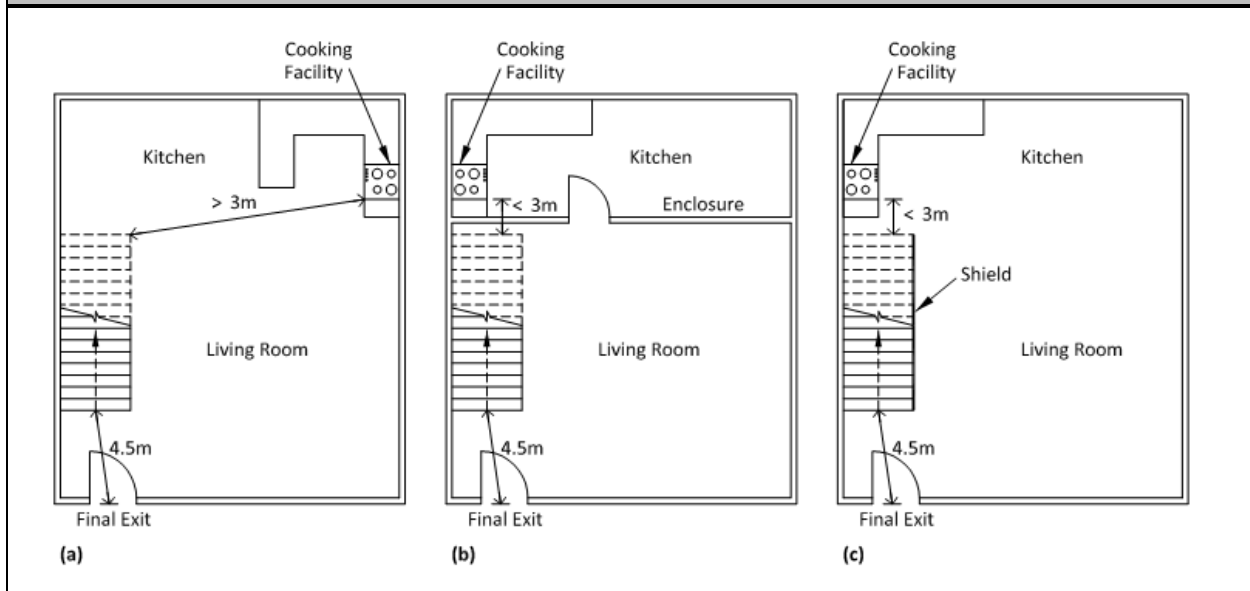
- (a) any habitable room which is an inner room should be provided with a window for escape or rescue in accordance with 1.3.7.
- (b) a stairway serving an upper storey should be enclosed with storey-height construction, which need not be fire-resisting, and should discharge directly to the open air
- (c) a fire detection and alarm system should be provided, in accordance with 1.3.6; and
- (d) The provisions regarding escape and rescue in 1.3.7 should be complied with.
- (e) The general provisions in 1.3.9 should be complied with.

1.3.2.1 An open-plan arrangement, where the stairway rises directly from the ground storey accommodation is less preferable than the arrangement at (b) above and is only acceptable where:

- (a) the stairway discharges to within 4.5 m of a door (final exit) at the ground storey leading directly to the open air;
- (b) the stairway does not discharge into a kitchen (see Diagram 1(a)) and either;
 - (i) any ground storey kitchen, where the cooking facilities are within 3m of the stairway is enclosed in storey height construction which need not be fire resisting (see Diagram 1(b)) or ;
 - (ii) where the stairway passes within 3m of the cooking facilities, the stairway should be shielded to the foot of the stairs with ceiling – height construction which need not be fire-resisting;(see Diagram 1 (c))

Diagram 1 Open plan arrangement for escape

Par.1.3.2.1



- (c) a fire detection and alarm system is provided, in accordance with 1.3.6
- (d) all habitable rooms at the upper storey are provided with windows for escape or rescue in accordance with 1.3.7; and
- (e) the design meets the general provisions for dwelling houses, outlined in 1.3.9.

1.3.3 Dwelling Houses with one Floor more than 4.5 m above ground level (Purpose Group 1(b))

The following provisions apply to dwelling houses where there is one storey which is at a height of more than 4.5m (see Diagram 3(c) & Appendix C, Diagram C4). This type of dwelling house will typically have three storeys above ground level:

- (a) a habitable room should not be an inner room unless:
 - (i) it has a floor level not more than 4.5 m above ground or access level; and

- (ii) it is provided with a door or window for escape or rescue which complies with the provisions of 1.3.7.

(b) unless the top storey is separated from the lower storey by fire-resisting construction (refer to S3 and Appendix A and Diagram 2(b)) and is provided with an alternative escape route leading to its own final exit, the internal stairway should:

- (i) be a protected stairway (see 1.3.8)
- (ii) connect the ground and all upper storeys; and
- (iii) either deliver directly to a final exit (Diagram 2 (a)) or give access to not less than two independent escape routes delivering to alternative final exits (see Diagram 2(b));

(c) automatic smoke detection and alarms should be provided in accordance with 1.3.6;

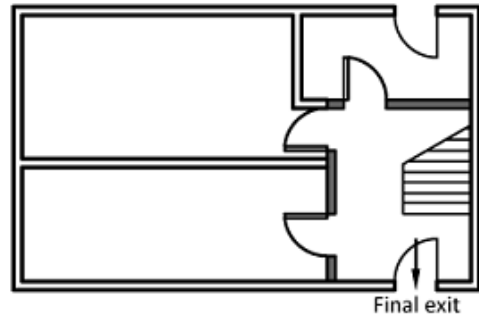
- (d) The provisions regarding escape and rescue in 1.3.7 should be complied with and
- (e) the general provisions for dwelling houses, outlined in par. 1.3.9 should be met.

1.3.4 Dwelling Houses with more than one Floor more than 4.5 m above ground level (Purpose Group 1(b))

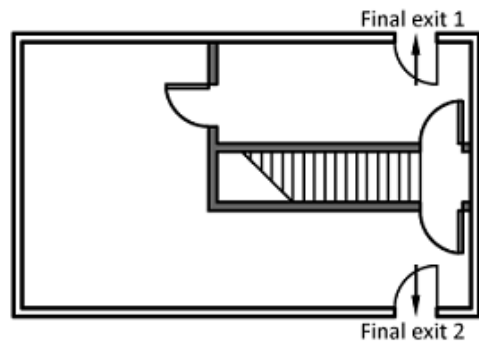
The following provisions apply to dwelling houses where there are more than one storey at a height of more than 4.5 m (see Diagram 3(d) and Appendix C, Diagram C4). This type of dwelling house will typically have four or more storeys above ground level:

- (a) a habitable room should not be an inner room unless it has a floor level not more than 4.5 m above ground level and
 - (i) it is provided with a door or window for escape or rescue which complies with the provisions of par. 1.3.7;
- (b) all upper floors should be served by a stairway which should
 - (i) be a protected stairway (see 1.3.8);
 - (ii) connect the ground and all upper storeys; and
 - (iii) either deliver directly to a final exit (see Diagram 2(a)) or give access to not less than two independent escape routes delivering to alternative final exits (see Diagram 2(b));

Diagram 2 - Alternative arrangements for escape via the ground floor in dwelling houses with floors more than 45 m above ground level
Par.1.3.3 &1.3.4.



(a) Protected stairway delivering directly to the final exit.



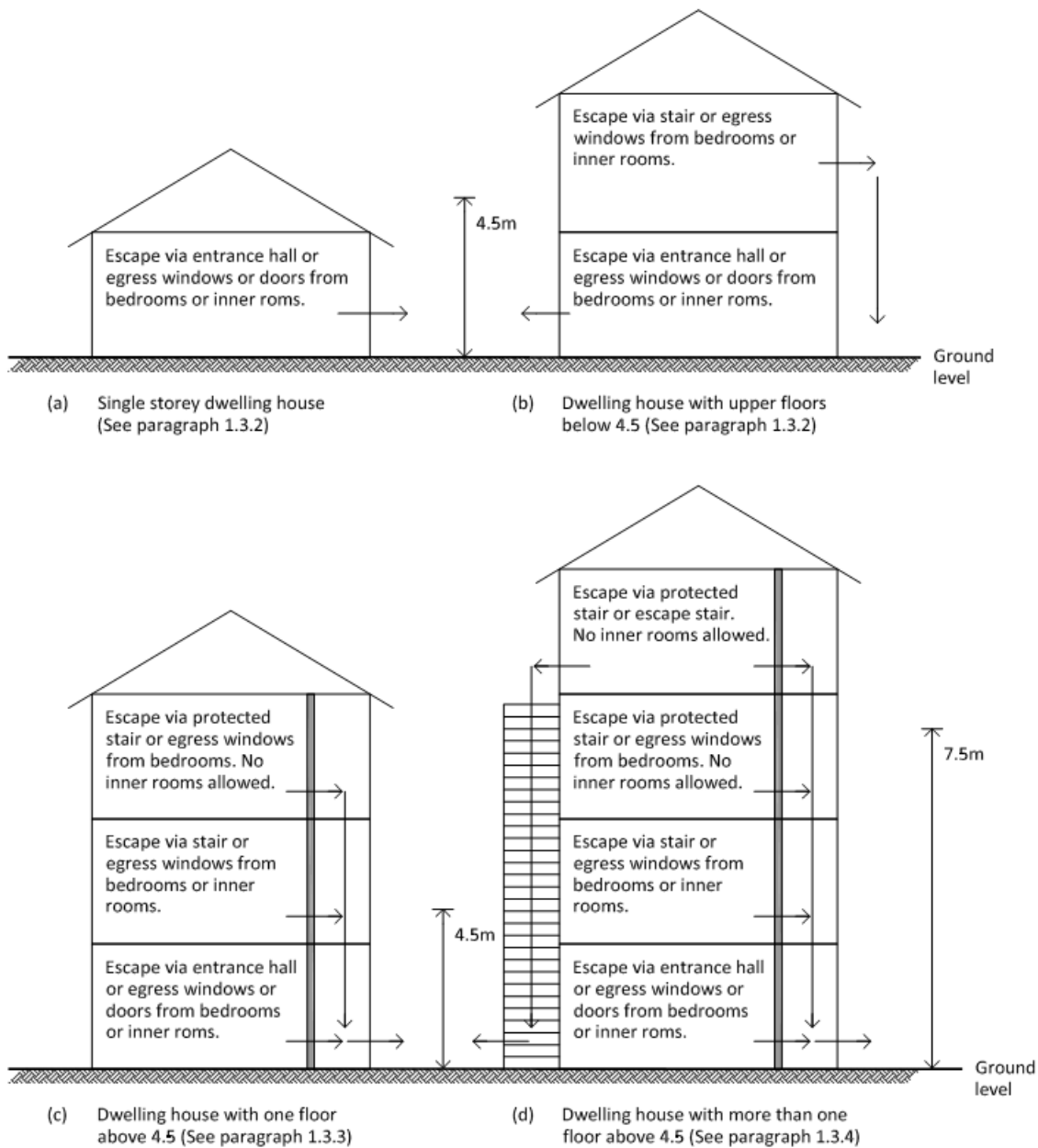
(b) Protected stairway affording access to two independent escape routes.

GROUND FLOOR PLANS

- KEY**
- 30 min. fire-resisting construction
 - Fire door (FD 20)

Diagram 3 Means of escape from Dwelling houses

Par.1.3.2, 1.3.3 & 1.3.4



KEY

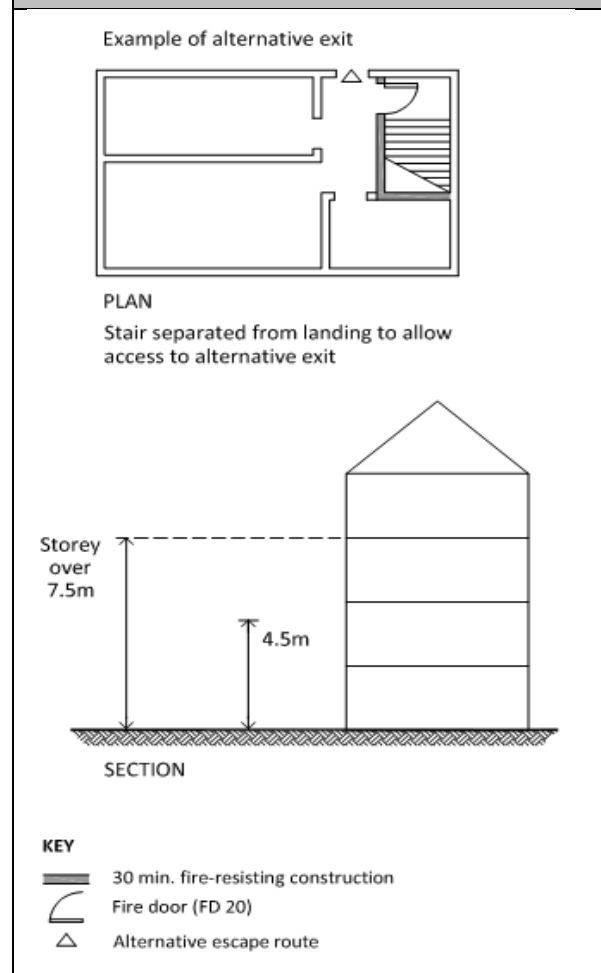
→ Direction of escape

▬ 30 min. fire-resisting construction

Note: This diagram must be read in conjunction with all of the relevant guidance given in Section 51.

- (c) an alternative escape route by way of an escape stairway should be provided from each storey which has a floor 7.5 m or more above the ground or access level. Where the access to the alternative escape route is by way of the protected stairway, the protected stairway at or about 7.5 m above ground or access level should be separated from the lower storeys or levels by fire resisting construction; (see Diagram 4)
- (d) the provisions regarding escape or rescue in par. 1.3.7 should be complied with for all floors below 7.5m;
- (e) automatic smoke detection and alarms should be provided in accordance with par.1.3.6; and
- (f) the general provisions for dwelling houses, outlined in par.1.3.9 should be met.
- (g) Where a dwelling house is constructed using timber frame construction, an automatic sprinkler system should be installed in accordance with BS 9251: 2014: *Fire sprinkler systems for domestic and residential occupancies – Code of practice*.

Diagram 4 Fire Separation in dwelling houses with more than one floor over 4.5m above ground level *Par. 1.3.4*



1.3.5 Community Dwelling house (Purpose Group 1(d))

The provisions contained in paragraphs 1.3.2 or 1.3.3 and 1.3.9 as appropriate are applicable to Community dwelling houses.

In addition to these general requirements, these dwelling houses are:

- (a) limited to 3 storeys.
- (b) limited to a maximum of 8 bedrooms none of which should be an inner room
- (c) required to have all escape routes protected by fire resisting construction irrespective of the height of the dwelling.(see Appendix A)
- (d) required to have a Fire Detection and Alarm System designed to comply with a minimum category LD1 Life safety system in accordance with I.S. 3218. Additionally a fire alarm control switch should be installed in conjunction with the LD1 FDAS to facilitate testing of the system.
- (e) required to have a self-contained emergency luminaire in corridors, hallways, landings and stairways. The emergency luminaire should:
 - (i) provide horizontal illuminance on the floor along the centre line of an escape route of not less than 1lux and the central band consisting of not less than half of the width of the route shall be illuminated to a minimum of 50% of that value
 - (ii) provide full luminance within 5 seconds of the failure of the normal lighting supply
 - (iii) maintain the level of luminance for not less than 3 hours.

(iv) be provided with batteries rated for at least 4 years normal operation

- (f) required to have fire doors to all protected stairways and corridors in accordance with Appendix B.

Further guidance is available in :“*Fire safety in Community Dwelling Houses :Code of practice for fire safety in new and existing Community Dwellings Houses* ” published by the Department of Housing Planning Community and Local Government .

1.3.6 Fire Detection and Alarm Systems

A fire detection and alarm system can significantly increase the level of fire safety in a dwelling house and should be provided in accordance with I.S. 3218:2013: *Fire Detection and Alarm Systems for Building: System Design, Installation Commissioning, Servicing and Maintenance*. This standard provides guidance on the provision of fire detection and alarm systems in dwellings. It refers to different grades and types of fire detection and alarm systems, which can provide varying levels of protection. The grade and system should be selected and installed in accordance with the following paragraphs.

1.3.6.1 Grades of fire detection and alarm systems

The grade of alarm system should be appropriate to the size of the dwelling house, the number of storeys and the fire risk. I.S.3218 provides guidance in this respect.

In general the following provisions are appropriate to satisfy the requirements of B6

Grade D system: An installation of self-contained mains-powered smoke or heat alarms each provided with an integral standby power supply. Where multiple units are provided all devices shall be interconnected so that detection of fire by any

one unit will provide an audible alarm from each unit.

For Grade D installations interconnections may be by radio or wiring. Where radio interconnection is used, manufacturer's recommendations on testing of signal strength/reception at each device shall be carefully followed and records kept.

1.3.6.2 Fire detection and alarm system types

Dwelling houses should be provided with a fire detection and alarm system as follows:

Category LD2 system for purpose group 1(a) and 1(b)

Category LD1 for purpose group 1 (d) or better in accordance with I.S.3218 designed for the protection of life.

Category LD2: Interconnected self-contained mains powered/battery backed Smoke/Heat Alarms (as Grade D above) shall be suitably located in:

- (1) all circulation areas that form part of an escape route within the dwelling, and
- (2) all high fire risk areas/rooms e.g. kitchen, living rooms, garages, utility rooms and
- (3) all bedrooms.

Where professional rooms, (see 1.3.9.6) are provided the FDAS should also cover this area

Category LD1: Includes all those areas specified in LD 2 but also includes all rooms and areas (including attics/lofts/other spaces) in which a fire might start, other than toilets, bathrooms and shower rooms.

1.3.6.3 Installation of smoke and heat alarms

Two types of self-contained smoke alarm, an optical type and an ionisation type, which have differing smoke response characteristics, are available. A mixture of both types is recommended and in the case of a typical two storey dwelling house, an optical type on the ground floor storey and an ionisation type on the upper floor is the most appropriate. The number and location of smoke alarms and heat alarms will be determined by the system type (see 1.3.6.2).

Smoke /heat alarms should be sited according to the following provisions:

- (a) In circulation areas, no door to a habitable room should be further than 7.5 m from the nearest smoke alarm.
- (b) Smoke and heat alarms should preferably be fixed to the ceiling, at least 300mm from any wall or light fitting. The method of fixing and location/spacing should take into account instructions provided by the manufacturer of the alarms.
- (c) It should be possible to reach all smoke and heat alarms to carry out, easily and safely, routine maintenance such as testing and cleaning. Instructions on maintenance requirements should be provided with all smoke alarm systems.
- (d) A heat detector is to be provided in kitchen areas in accordance with the relevant provisions of I.S. 3218: 2013

Note: This guidance applies to ceilings that are predominantly flat and horizontal

1.3.6.4 Any new extension to an existing dwelling house should have a Fire Detection and Alarm System in accordance with 1.3.6.2.

added by converting the existing roof space into habitable accommodation, the converted dwelling house should comply with the provisions of 1.3.2.

Where the following conditions apply, and where an extension creates one or more habitable rooms a Fire Detection and Alarm System should be provided throughout the whole dwelling house:

In the case of an existing two storey dwelling house to which a storey is to be added by converting the existing roof space into habitable accommodation, the converted dwelling house should comply with the provisions of 1.3.3

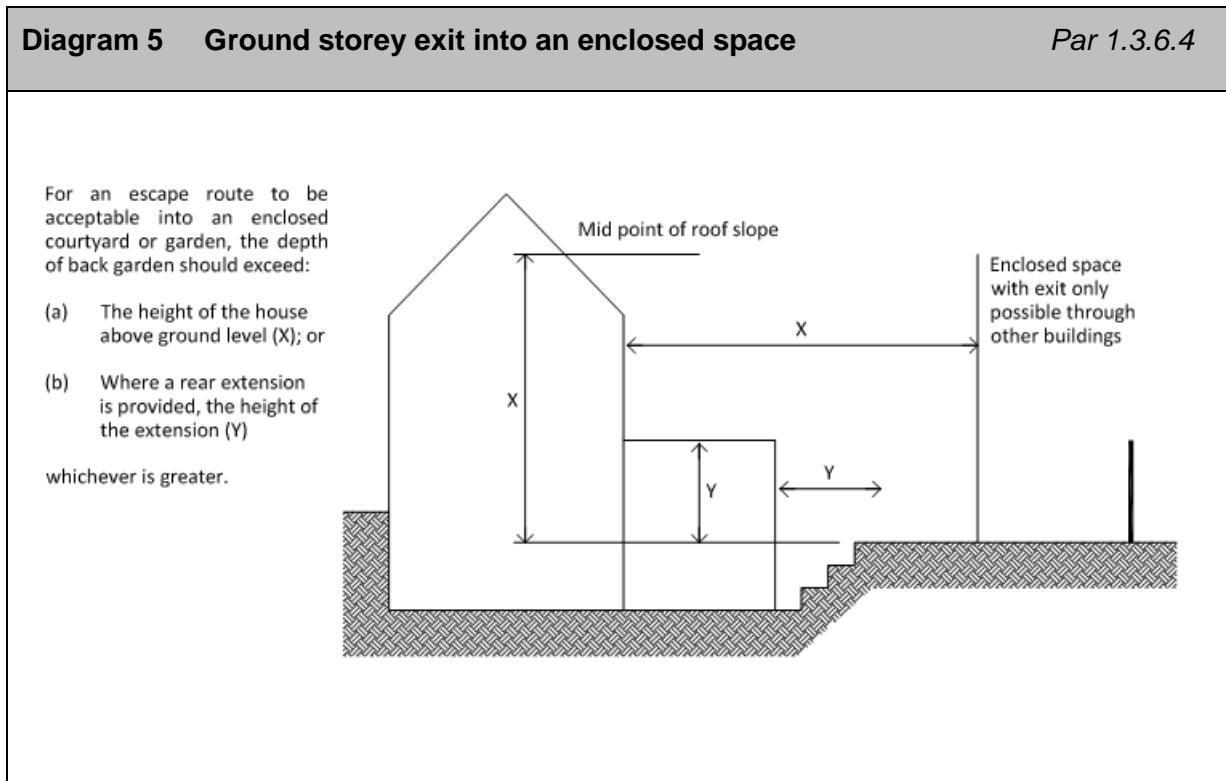
- (a) the rear garden is enclosed
- (b) the only escape route is through a room in the dwelling house and
- (c) the provisions in Diagram 5 are not met.

1.3.6.5.1 The provisions in Appendix D may be applied as an alternative to those in 1.3.3 where the new second storey accommodation does not:

- (a) exceed 50 m² in area; or
- (b) contain more than two habitable rooms.

1.3.6.5 Loft Conversions

In the case of an existing single storey dwelling house to which a storey is to be



1.3.7 Windows for escape or rescue

paragraph

1.3.7.1 General

Windows may provide an alternative means of escape or may be used for rescue purposes in dwelling houses of limited height.

As a general provision, all bedrooms in dwelling houses, other than bedrooms with doors that give direct access to the outside should have at least one window which complies with the provisions herein.

As an alternative, a door which gives direct access to a balcony which is suitable for rescue by ladder or for escape may be used. Where provision is made in this subsection for windows for these purposes (see paragraph 1.3.2, 1.3.3, 1.3.4 and 1.3.5) such windows should comply with the following:

- (a) The window should have an openable section which provides an unobstructed clear open area of at least 0.33 m².

The height should be not less than 450mm. The width should be not less than 450mm. The opening section should be capable of remaining in the position which provides this minimum clear open area.

- (b) The bottom of the window opening should be not more than 1100 mm and in the case of a rooflight not less than 600mm above the floor, immediately inside or beneath the window or rooflight.

- (c) As an exception to the general guidance in TGD K that guarding be provided for any window, the cill of which is less than 800 mm in height above floor level, (where the external ground level is below 1.4m below floor level), guarding should not be provided to a rooflight opening provided in compliance with this

- (d) In the case of a dormer window or rooflight, the distance from the eaves to the bottom of the opening section of the rooflight, or, where the window is vertical, the vertical plane of the window, should not exceed 1.7 m measured along the slope of the roof.

- (e) The area beneath the window externally should be such as to make escape or rescue practicable. For example;

- (i) where there is a clear drop from a window in an upper storey or attic conversion, the ground beneath the window should be suitable for supporting a ladder safely and be accessible for rescue by the fire services or others.

- (ii) Where there is a roof, conservatory, balcony or canopy below a window for escape or rescue, it should be structurally adequate to support those using the window.

- (f) The opening section of the window should be secured by means of fastenings which are readily openable from the inside. In certain circumstances safety restrictors may be fitted to such windows see TGD K Section 2.7. Lockable handles or restrictors, which can only be released by removable keys or other tools, should not be fitted to window opening sections for escape or rescue.

1.3.7.2. Replacement Windows

Where windows are being replaced in existing dwelling houses, bedroom windows should meet, in as far as is practicable, the provisions outlined at 1.3.7.1 (a) to (e) above. In the case of other habitable rooms, opening sections should not be reduced or altered to

an extent that reduces their potential for escape or rescue.

1.3.8 Escape stairways

Escape stairways should comply with the requirements of Section 1 of Technical Guidance Document K - *Stairways, Ladders, Ramps and Guards*, to the Building Regulations, 2014.

An exception to this requirement may be made in the case of an existing stairway in an existing building which is capable of affording safe passage for the users of the building.

Where an escape stairway is a protected stairway the performance requirements for the enclosure are indicated in Appendix A (Tables A1)

1.3.9 General Provisions for Dwelling Houses

1.3.9.1 Inner rooms

An inner room is where the access to that room is through another room. A habitable room should not be an inner room unless it is located at basement, ground or first storey and is provided with a window or door suitable for escape or rescue in accordance with the provisions of 1.3.7

1.3.9.2 Heat producing appliances

Heat Producing appliances include cookers, boilers, stoves and open fires which are designed to burn oil, gas or solid fuel. These appliances are a potential source of ignition for fires and it is important that they are correctly installed in dwelling houses. Part J of the Second Schedule to the Building Regulations contain requirements in relation to heat producing appliances. Technical Guidance Document J - (*Heat Producing Appliances*), provides guidance on how to comply with Part J.

1.3.9.3 Ducts

Where a ducted warm air heating system or a Mechanical Ventilation with Heat Recovery system or similar is provided in a dwelling house, precautions should be taken to ensure that it will not contribute to fire spread or endanger the enclosure to any stairway, particularly with regard to protected stairways, B.S.9991: 2015 *Fire Safety in the Design, Management and use of Residential Buildings: Section 6, paragraph 35*, contains appropriate guidance on these measures. (see also S3- Internal Fire Spread).

It is not recommended to connect cooker hoods to Mechanical Ventilation with Heat Recovery systems. Where cooker hoods are connected the guidance under fire precautions in BRE Digest 398 "*Continuous mechanical ventilation in dwellings*" should be followed.

1.3.9.4 Electrical installations

The electrical installation, comprising wiring, sockets, switches, fuses, distribution board, circuit breakers, earthing, etc., should comply with ET101:2008: *National Rules for Electrical Installations* produced by the Electro-Technical Council of Ireland.

1.3.9.5 Basements

Basements, where provided in dwelling houses, should be separated from the ground floor storey by means of fire resisting construction.

Where a dwelling house is provided with a basement, all floors should be served by a protected stairway unless the basement rooms have an alternative means of escape. Any basement habitable room which is an inner room or basement bedroom should be provided with an alternative means of escape

The fire detection and alarm system should include the basement areas

1.3.9.6. Professional Rooms

In the case of P.G.1(a) and P.G.1(b) any surgery, consulting rooms, offices or other accommodation not exceeding 50m² forming part of the dwelling house and used by the occupant of the dwelling house in a professional capacity should be provided with a smoke alarm as part of the domestic alarm system, an emergency light and escape signage.

1.3.9.7 Final Exits

Any final exit door in a dwelling house or a door which gives direct access to a balcony as provided in 1.3.7 should be provided with simple fastenings (thumb latches or other readily openable mechanism) which can be operated from the escape side without the use of a key.

1.3.9.8 Fire Doors

Any door between a dwelling house and a garage should be an E30Sa or FD30S in accordance with the requirements of Appendix B.

1.3.9.9 Galleries

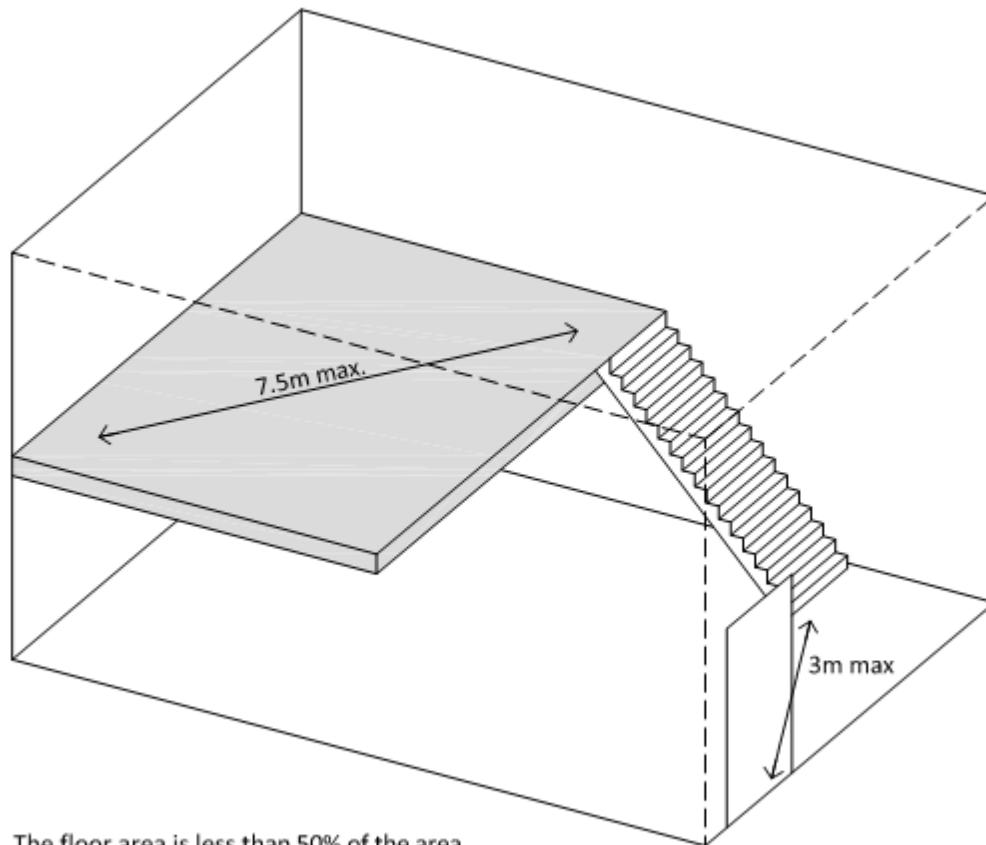
A gallery should be treated as a storey and a dwelling house with a gallery should comply with sections 1.3.2 ,1.3.3. or 1,3,4.

Where all of the following conditions are complied with the gallery need not be considered a storey:

- (a) it is not designed for use as a sleeping area;
- (b) the gallery should not project into more than 50% of the area of the room below (see Diagram 6);
- (c) the distance between the foot of the access stair to the gallery and the door to the room containing the gallery should not exceed 3m;
- (d) the distance from the head of the access stair to any point on the gallery should not exceed 7.5m; and
- (e) any cooking facilities within a room containing a gallery should either:
 - (i) be enclosed in storey height construction which need not be fire-resisting or
 - (ii) be not less than 3 m from the stair to the gallery and positioned such that they do not prejudice the escape from the gallery.

Diagram 6 Gallery floors with no alternative exit

Par. 1.3.9.9



The floor area is less than 50% of the area of the space into which it projects

Section 2

Internal Fire Spread (linings)

Internal fire spread (linings)	B7	For the purpose of inhibiting the spread of fire within a dwelling house, the internal linings: <ul style="list-style-type: none">(a) shall have, either a rate of heat release or a rate of fire growth and a resistance to ignition which is reasonable in the circumstances; and(b) shall offer adequate resistance to the spread of flame over their surfaces
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2.1 Internal Fire Spread (linings)

2.1.1 General

2.1.1.1 The purpose of the requirement of Regulation B7 is to ensure that the fire spread over the internal linings is inhibited.

2.2 Performance

The requirement of B7 may be met as follows:

- (a) In relation to the European fire tests and classification system, the requirement of B7 will be met if the heat released from the internal linings is restricted by making provision for them to have a rate of fire growth and a resistance to ignition which is reasonable in the circumstances or
- (b) The requirement of B7 may be met if the spread of fire over the internal linings of the building is restricted by making provision for them to have low rates of surface spread of flame and in some cases to have a low rate of heat release or a rate of fire growth, so as to limit the contribution that the fabric of the building makes to fire growth.

The extent to which this is necessary is dependent on the location of the lining.

2.3 Introduction to Provisions

2.3.1 Fire Spread and Lining Materials

The choice of materials for the lining of walls and ceilings can significantly affect the spread of a fire, and its rate of growth, even though they are not likely to be the materials first ignited. This is particularly important in circulation spaces where linings would offer the main vehicle for fire spread, and where rapid spread would be most likely to prevent occupants from escaping.

Several properties of lining materials influence fire spread. These include the ease of ignition and the rate at which the lining material gives off heat when burning. The guidance relating to the European fire tests and classification provides for control of internal fire spread through control of these properties.

2.3.2 Floors and Stairways

It is impractical to attempt to control the materials used to cover floors and stairways through Building Regulations, and no provisions are made in this Document about them

2.3.3 Furniture and Fittings

Furniture and fittings can have a major effect on fire spread but it is impractical to attempt to control them through Building Regulations and no provisions is made in this Document about them.

2.3.4 Other Controls on Linings Properties

There are provisions for the control of fire growth in Section 4, sub-section 4.4 concerning the external surface of walls and in sub-section 4.6 concerning the surface of rooflights in connection with the performance of roof coverings.

2.3.5 Classification of Performance

Appendix A describes the different classes of performance for materials used as a wall or ceiling lining and the appropriate methods of test, including performance ratings for thermoplastic materials, referred to as TP(a) rigid and TP(b).

The European classifications are described in I.S. EN 13501-1:2007 +A1:2009, *Fire classification of construction products and building elements, Part 1- Classification using data from reaction to fire tests*. They are based on a combination of four European test methods:

I.S. EN ISO 1182: 2010, *Reaction to fire tests for building products - Non combustibility test;*

I.S. EN ISO 1716: 2010, *Reaction to fire tests for building products - Determination of the gross calorific value;*

I.S. EN 13823: 2002, *Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item and*

IS EN ISO 11925-2: 2010, *Reaction to fire tests for building products, Part 2 - Ignitability when subjected to direct impingement of flame.*

For some building products, there is currently no generally accepted guidance on the appropriate procedure for testing and classification in accordance with the European fire tests. Until such time that the appropriate European test and classification methods for these building products are published, classification may only be possible using existing national test methods.

The National classifications used are based on tests in BS 476: Parts 6 and 7. Tests in BS 2782 and BS 5438 are used for classification of thermoplastic materials.

Table A5 of Appendix A gives typical performance ratings which may be achieved by some generic materials and products.

2.3.6 Assessment of Performance

Combustible linings can contribute significantly to the spread of fire in a building and their use should be restricted. The fire performance of lining materials is especially important in circulation spaces and on escape routes. An assessment of the likely performance of lining materials should take account of the following:

- the performance of the lining materials in accordance with the criteria indicated in paragraphs A7 to A19 of Appendix A,
- the extent and thickness of the lining materials,
- the likely interaction between wall and ceiling linings and between linings and any combustible fittings or fixtures,
- the extent of voids behind the lining materials and the existence of electrical services in such voids.

Care should be taken to ensure that any products which are used to treat lining materials for the purpose of inhibiting spread of flame are applied, and maintained, strictly in accordance with the specification applicable to the relevant test certification supplied by the manufacturer of such products.

Surface treatment of linings is not, in general, a suitable method of achieving class B - s3, d2 (European class) or Class 0 (National class) performance (see A10 of Appendix A).

However, in the case of existing lining materials, which satisfy the assessment criteria indicated above, surface treatment to achieve the required performance may be considered.

Note: Care should be taken to ensure that a build-up of combustible paints does not reduce the classification of any wall or ceiling lining.

2.4 General Provisions

Subject to the variations and specific provisions described in the paragraphs below, the surface linings of walls and ceilings should meet the following classifications as outlined in Appendix A Table A5.

- (a) Class D - s3, d2 (European class) or Class 3 (National class) in bathrooms, toilets and shower rooms.
- (b) Class C - s3, d2 (European class) or Class 1 (National class) in other rooms
- (c) Class C - s3, d2 (European class) or Class 1 (National class) in circulation spaces within dwellings,

2.5 Variations and Special Provisions

2.5.1 Walls

Part of the surface of a wall in a room may be of a class lower than specified in 2.4, (but not lower than Class D - s3, d2 (European) or Class 3 (National)) if the area of that part (or, if there are two or more such parts, the total area of those parts) does not exceed –

- (a) half the floor area of the room, or
- (b) 20 m²: and

any individual part should not exceed 5 m² and should be separated from any other such part by a distance of not less than 2m;

Note: A wall does not include a door or glazing in a door.

2.6 Thermoplastic Materials

Thermoplastic materials (see Appendix A, paragraphs A15, A16) which cannot meet the performance specified in paragraph 2.4 can be used in windows, rooflights and lighting diffusers in ceilings if they comply with the provisions of the following paragraphs:

2.6.1 Windows

External windows to rooms (though not to circulation spaces) may be glazed with thermoplastic materials, if the material can be classified as a TP(a) rigid product.

Internal glazing should meet the provisions in par. 2.4 above.

2.6.2 Rooflights

Rooflights to rooms and circulation spaces (with the exception of protected stairways) may be constructed of a thermoplastic material if:

- (a) the lower surface has a TP(a) (rigid) or TP(b) classification (see paragraph A16, Appendix A)
- (b) the size and disposition of the rooflights accords with the limitations in Table 2.1, Diagram 8 and Table 4.4 to Section 4.

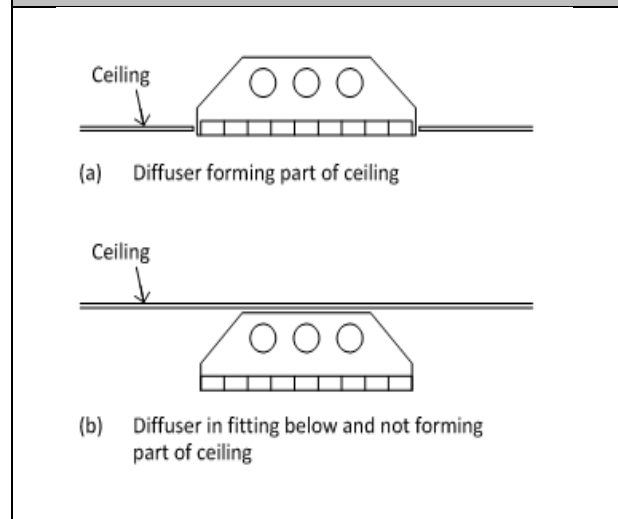
2.6.3 Lighting Diffusers

Lighting diffusers are translucent or open-structured elements that allow light to pass through. They may be part of a luminaire or used below rooflights or other sources of light. The following provisions apply only to lighting diffusers which form part of a ceiling and are not concerned with diffusers of light fittings which are attached to the soffit of, or suspended beneath a ceiling (See Diagram 7)

Thermoplastic lighting diffusers should not be used in fire protecting or fire resisting ceilings, unless they have been satisfactorily tested as

part of the ceiling system that is to be used to provide the appropriate fire protection.

Diagram 7 Lighting Diffuser in relation to ceiling *Par. 2.6.3*



Ceilings to rooms and circulation spaces (but not protected stairways) may incorporate thermoplastic lighting diffusers if the following provisions are observed:

- (a) Wall and ceiling surfaces exposed within the space above the suspended ceiling (other than the upper surfaces of the thermoplastic panels) should comply with the general provisions of par. 2.4, according to the type of space below the suspended ceiling.
- (b) If the diffusers are of classification TP(a) (rigid), there are no restrictions on their extent.
- (c) If the diffusers are of classification TP(b), they should be limited in extent as indicated in Table 2.1 and Diagram 8.

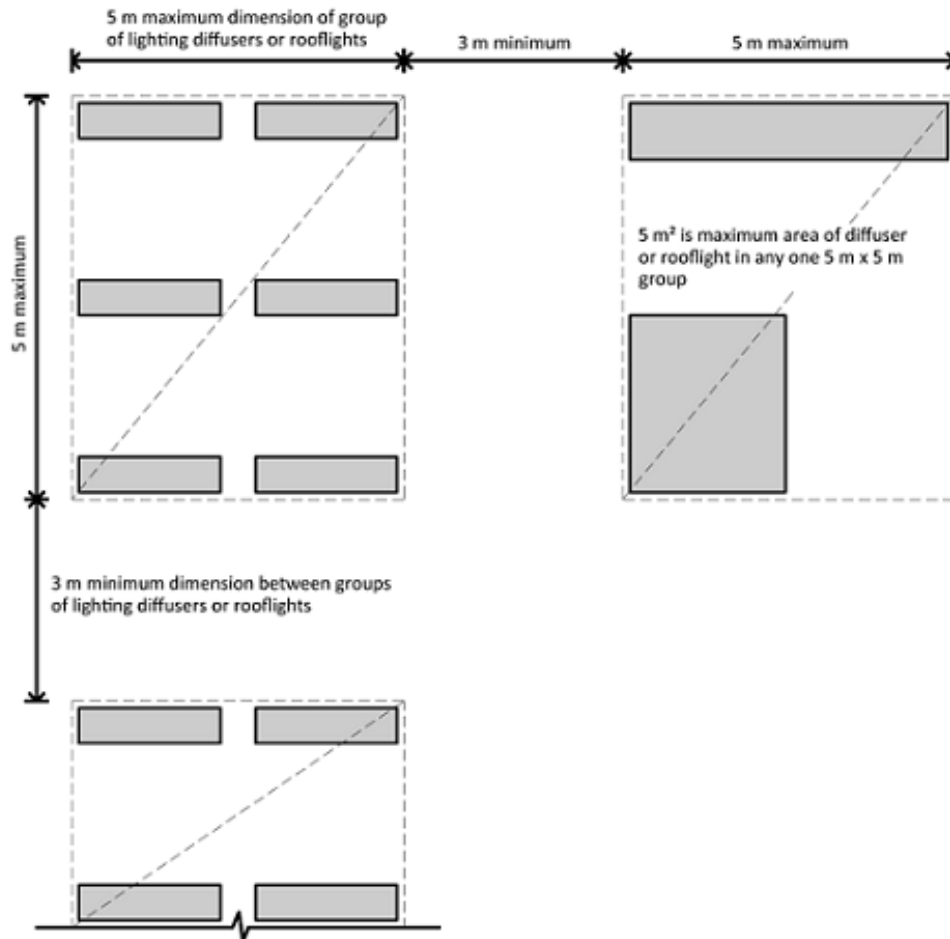
Thermoplastic materials which have a lesser performance than TP(b) should not be used for lighting diffusers which form part of a ceiling.

Table 2. 1 Limitations applied to thermoplastic lighting diffusers in suspended ceilings and thermoplastic rooflights.				
Minimum classification of lower surface	Use of space below the diffusers or rooflight	Maximum area of each diffuser panel or rooflight (1)	Max total area of diffuser panels and rooflights as percentage of floor area of the space in which the ceiling is located	Minimum distance between diffuser panels or rooflights (1)
TP(a) Rigid	any except protected stairway	No Limit	No Limit	No Limit
TP(b)	rooms	5 m ²	50%	3 m
	circulation spaces except protected stairways	5 m ²	15%	3 m

Note:



1. Smaller panels can be grouped together provided that the overall size of the group and the space between one group and any others satisfies the dimensions shown in Diagram 8.

Diagram 8 Layout restrictions on TP(b) thermoplastic lighting diffusers and rooflights *Par 2.6.3*



NOTE: Upper and lower surfaces of suspended ceilings between thermoplastic lighting diffusers or rooflights to comply with provisions outlined at 2.4.

KEY

-  Lighting diffuser or rooflight
-  Separated groups of lighting diffuser or rooflights

Section 3

Internal Fire Spread (Structure)

Internal fire spread (structure)	B8	(1) A dwelling house shall be so designed and constructed that, in the event of fire, its stability will be maintained for a reasonable period. (2) (a) A wall common to a dwelling house and to one or more adjoining buildings shall be so designed and constructed that it offers adequate resistance to the spread of fire between those buildings. (b) A dwelling house shall be sub-divided with fire resisting construction where this is necessary to inhibit the spread of fire within the dwelling house. (3) A dwelling house shall be so designed and constructed that the unseen spread of fire and smoke within concealed spaces in its structure or fabric is inhibited where necessary. (4) For the purposes of sub-paragraph 2(a), a dwelling house in a terrace and a semi-detached dwelling house are each to be treated as being a separate building.
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3.1 Internal Fire Spread (structure)

3.1.1 General

The purpose of the requirement of Regulation B8 is to ensure the stability of buildings in the event of fire, that there is a sufficient degree of fire separation within dwelling houses and between adjoining buildings, and to inhibit the unseen spread of fire and smoke in concealed spaces in buildings;

3.2 Performance

The requirements of B8 may be met:

- (a) if the structural elements of the building are capable of withstanding the effects of fire for an appropriate period without loss of stability,
- (b) if the building is sub-divided by elements of fire-resisting construction into compartments,
- (c) if any openings in fire separating elements are suitably protected in order to maintain the fire integrity of the element, and

- (d) if any hidden voids in the construction are sealed and subdivided to inhibit the unseen spread of fire and products of combustion, in order to reduce the risk of structural failure and the spread of fire, in so far as they pose a threat to the safety of people in and around the building.

The extent to which any of these measures are necessary is dependent on the use of the building and, in some cases its size, and on the location of the element of construction.

3.3 Introduction to Provisions

3.3.1 Provisions for loadbearing elements of structure are given in sub-section 3.4. Sub-section 3.5 is concerned with the subdivision of a building into compartments, and sub-section 3.6 makes provisions about concealed spaces (or cavities).

Sub-section 3.7 gives information on the protection of openings and on fire-stopping which relates to compartmentation and to fire spread in concealed spaces. Common to all these sub-sections and to other provisions of this Document is the property of fire resistance.

3.3.2 Fire Resistance

The fire resistance of an element of construction is a measure of its ability to withstand the effects of fire in one or more ways:

- (a) resistance to collapse, i.e. the ability to maintain loadbearing capacity (which applies to loadbearing members only);(R in European Classification)
- (b) resistance to fire penetration, i.e. an ability to maintain the integrity of the element (which applies to fire-separating elements);(E in European Classification)
- (c) resistance to the transfer of excessive heat, i.e. an ability to provide insulation from high temperatures (which applies to fire-separating elements);(I in European Classification)

3.3.3 Provisions Elsewhere in Technical Guidance Document B concerning Fire Resistance

There are provisions in Section 1 concerning the use of fire-resisting construction to protect means of escape.

There are provisions in Section 4 for fire resistance of external walls to restrict the spread of fire between buildings. Appendix A gives information on methods of test and performance for elements of construction.

Appendix B gives information on fire-resisting doors.

3.4 Loadbearing Elements of Structure

3.4.1 Introduction

Premature failure of the structure can be prevented by provision for loadbearing elements of structure to have a minimum standard of fire resistance, in terms of resistance to collapse or failure of loadbearing capacity.

The purpose in providing the structure with fire resistance is threefold:

- (a) to protect the occupants;
- (b) to protect fire fighters who may be engaged in search or rescue operations (though this is limited and is not intended to cover fire-fighting operations generally);
- (c) to reduce the danger to people in the vicinity of the building who might be hurt by falling debris or by the impact of the collapsing structure on other buildings.

3.4.2 Fire Resistance Standard

Structural frames, beams, columns, loadbearing walls (internal and external), floor structures, should have at least the fire resistance given in Appendix A, Table A1.

3.4.3 Application of the Fire Resistance Standards for Loadbearing Elements (see Appendix A, Tables A1)

The measures set out in Appendix A include provisions to ensure that where one element of structure supports or gives stability to another element of structure, the supporting

element has no less fire resistance than that required for the other element.

The measures also provide for elements of structure that are common to more than one building or compartment, to be constructed to the standard of the greater of the relevant provisions.

Special provisions about fire resistance of elements of structure in single storey buildings are also given, and there are concessions in respect of fire resistance of elements of structure in basements where at least one side of the basement is open at ground level. See "Application of the fire resistance standard in Table A1" in Appendix A.

3.4.4 Exclusions from the Provisions for Elements of Structure

The following are excluded from the definition of elements of structure for the purposes of these provisions:

- (a) a structure that only supports a roof, unless the roof performs the function of a floor, or as a means of escape (see S1) or is essential for the stability of an external wall which is required to have fire resistance (see S4);
- (b) the lowest floor of the building.

3.4.5 Additional Provisions

Additional provisions are required if a loadbearing wall is also:

- (a) Separating wall (this includes a wall common to two buildings) (see 3.5);
- (b) a wall between a dwelling house and a domestic garage (par. 3.5.2);
- (c) protecting a means of escape (see Appendix A : Table A1)
- (d) an external wall (see S4, sub-section 4.4 and 4.5);

3.5 Compartmentation

3.5.1 Introduction

The spread of fire within a building can be restricted by sub-dividing it into compartments separated from one another by walls and/or floors of fire-resisting construction. The object is twofold:

- (a) to prevent rapid fire spread which could trap occupants of the building; and
- (b) to reduce the chance of fires becoming large, on the basis that large fires are more dangerous, not only to occupants but to people in the vicinity of the building.

Compartmentation may be complementary to provisions made under Section 1 for the protection of escape routes, and to provisions made under Section 4 against the spread of fire between buildings.

3.5.2 Forms of Compartmentation

Compartment walls should be provided in dwelling houses in the circumstances described below,

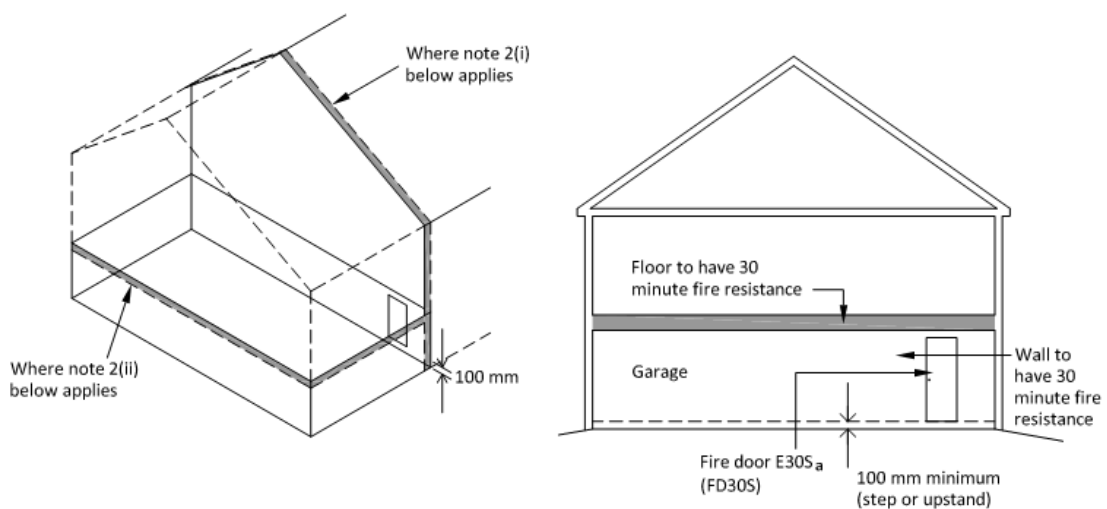
Special forms of compartmentation to which particular construction provisions apply, are:

- (a) walls common to two or more buildings (separating wall),
- (b) Any wall between semi-detached dwelling houses, or houses in a terrace, should be constructed as a separating wall and the dwelling houses should be considered as separate buildings.
- (c) If a domestic garage is attached to (or forms part of) a dwelling house, the Walls, floors and ceilings should provide the fire separation from the rest of the dwelling house as indicated in Diagram 9.

- (d) Where a door is provided between a dwelling house and the garage, the door opening should be positioned at least 100mm above garage floor level (see Diagram 9) and should be fitted to open into the garage. Alternatively the floor of the garage should be laid to fall not less than 1:100 to allow fuel spills to flow away from the door.
- (e) In the case of a single storey house in order to maintain a 30min fire separation between the house and the garage either:
- (i) the wall between the house and the garage should be taken up to the underside of the roof or
 - (ii) the ceiling of the garage should have a minimum period of fire resistance of 30min.

Diagram 9 Separation between garage and dwelling house

Par. 3.5.2



Notes:

1. Wall and any floor between garage and house to have 30 min. fire resistance. Any opening in the wall to be at least 100 mm above garage floor level and be fitted with an E30S_a (European) or FD30S (National) door;
2. In the case of a single storey house, in order to maintain a 30 minutes standard of fire separation between the house and the garage, either:
 - (i) the wall between the house and the garage should be taken up to the underside of the roof, or
 - (ii) the ceiling to the garage should be made fire resisting.

3.5.3 Limits to Compartment sizes

There is no limit on the floor area or cubic capacity of a compartment in a Residential Dwelling of Purpose Groups 1(a), 1(b) or 1(d).

3.5.4 Construction of Compartment Walls

Every compartment wall/separating wall should:

- (a) form a complete barrier to fire between the buildings they separate;
- (b) have the appropriate fire resistance as indicated in Appendix A, Table A1;

The performance requirements for fire resisting elements of construction are indicated in Appendix A, paragraph A5.

3.5.4.1 Openings in Fire Resisting construction

Any door provided between a dwelling house and a garage should be protected by means a fire door, in accordance with the provisions outlined in Appendix B and Table B1.

Openings between compartments for the passage of pipes, ducts and other services should be protected in accordance with the provisions outlined in sub-section 3.5.4 for framed compartment walls see 3.5.4.3.

Note: No openings are allowed in separating walls (see 3.5.4.4)

3.5.4.2 Separating walls

Separating walls should run the full height of the building in a continuous vertical plane and should be constructed of non-combustible (see Appendix A, Table A8) materials.

Adjoining buildings should only be separated by walls, not floors.

3.5.4.3 Separating walls in timber framed construction

An exception to the requirement for separating walls to be constructed of non-combustible materials may be permitted in the case of separating walls in timber frame dwelling houses built in accordance with

I.S.440: Timber Framed Dwellings; between buildings of up to three storeys, (four storeys where the provisions of section 1.3.4(vi) are complied with) where the design, materials and workmanship used in the manufacture and construction of the wall are in accordance with the provisions of Technical Guidance Document D (Materials and Workmanship)

3.5.4.4 Services in separating walls

No services should pass through or breach separating walls.

In timber framed construction, where necessary, a service cavity external to the unbreached linings of the fire resistant separating wall should be provided to accommodate services as outlined in IS 440.

3.5.4.5 Junction of separating wall with other walls

Where a separating wall meets an external wall, the junction should be fitted with a cavity barrier in accordance with Diagram 12 or where no cavity exists, maintain the fire resistance of the separating wall, or in the case of external insulation systems a fire stop within the insulation in the plane of the separating wall.

3.5.4.6 Junction of separating wall and roof

The junction between a separating wall and the roof of a building should be capable of restricting fire spread between the buildings.

A separating wall should be taken up to meet the underside of the roof covering or deck and fire stopped where necessary at the wall/roof junction.

The construction of the wall, particularly between any ceiling and the roof, should not contain imperfections that would provide a route for fire penetration or premature failure of the fire resistance performance of the wall.

The gap between the wall and the underside of the roof should be as small as practicable (generally not greater than 50 mm) and be

filled with suitable fire stopping material over the full width of the wall.

Where structural roof members such as beams, purlins and rafters are built into a separating wall, any openings for them should be as small as practicable and any gaps should be effectively fire stopped with non-combustible fire stopping material over the full width of the wall.

No structural roof member should be carried across a separating wall.(except where specified at (a) below)

The design and detailing of the junction between a separating wall and any roof valley, gutter, or other roof configuration, should be carefully considered so as to ensure that a means is not provided at the junction for premature fire spread between compartments or buildings.

If a fire penetrates a roof near a separating wall there is a risk that it will spread over the roof to the adjoining building. To reduce that risk, the junction between a separating wall and a roof should be constructed in accordance with the following:

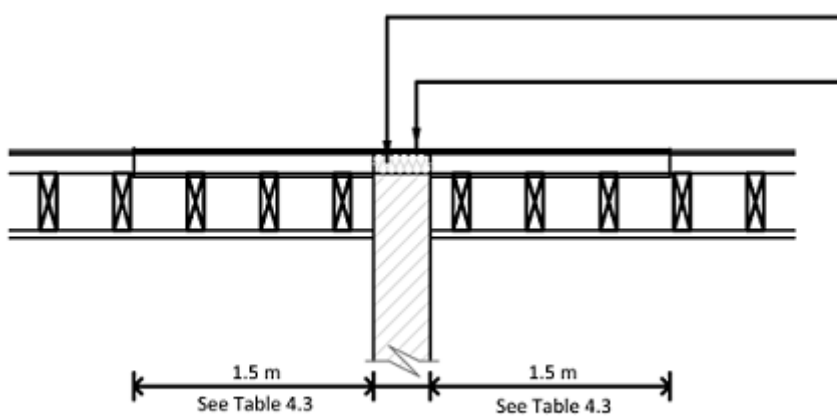
- (a) In dwelling houses not more than 15m high a zone of the roof at least 1.5m wide (see Table 4.3) on both sides of the wall should have a covering of class B_{Roof(t4)} (European class) or AA, AB, or AC (National class) (see table A4 to Appendix A). Where timber tiling battens or combustible boarding used as a substrate to the roof covering, are to be carried over the separating wall, they should be fully bedded in mortar or other suitable non-combustible fire stopping material for the full width of the wall. Boarding should not exceed 25 mm in thickness, and any cavities within the thickness of the roof, above and below the sarking felt or similar membrane along the line of the wall and at the eaves should be

adequately fire stopped (see Diagram 10(a)).

- (b) As an alternative to (a) above the separating wall may be extended above the line of the external roof surface by a height of not less than 375 mm to form a parapet wall (see Diagram 10(b)).
- (c) As an alternative to (a) or (b) above, any other system which has been shown by test to be equally effective in restricting the spread of fire at a separating wall/compartment wall/roof junction may be used.

Diagram 10

Junction of Separating wall with roof for Dwelling Houses not more than 15m high
Par 3.5.4.6

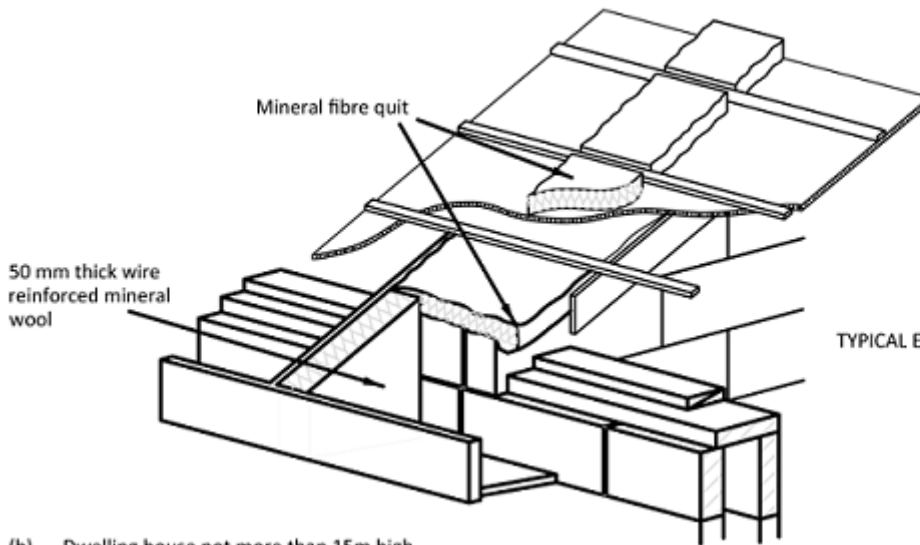


Firestopping to be carried up to underside of roof covering.

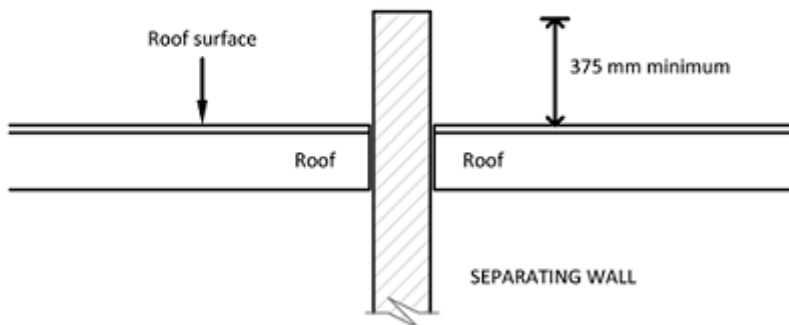
Roof covering to be of class B_{ROOF} (t4) (European class) or to be designated AA, AB or AC (National Class) on deck of material of limited combustibility over at least this distance.

Boarding (used as a substrate), woodwool slabs or timber tiling battens may be carried over the wall provided that they are fully bedded in mortar (or other non-combustible fire stopping material) where over the wall.

(a) Dwelling house not more than 15m high



(b) Dwelling house not more than 15m high



(b) Parapet wall (alternative detail and building)

3.6 Concealed Spaces (Cavities)

3.6.1 Introduction

Hidden voids in the construction of a building provide a ready route for smoke and flame spread. This is particularly so in the case of voids above other spaces in a building, e.g. above a suspended ceiling or in a roof space. As the spread is concealed, it presents a greater danger than would a more obvious weakness in the fabric of the building. Provisions are made to restrict this by interrupting cavities which could form a pathway around a barrier to fire, and subdividing extensive cavities.

It should be noted that cavity barriers should not be provided above separating walls as these walls are required to be carried up full storey height to the roof.

The fire resistance standards for cavity barriers are lower than for a separating wall and it is important to use a separating wall in this situation to maintain the standard of fire resistance.

3.6.2 Provision of Cavity Barriers

Cavity barriers should be provided in accordance with the following:

- (a) At the top of an external cavity wall (masonry or framed construction) including any gable wall.
- (b) Vertically at the junction of separating wall and any such wall with an external cavity wall (Diagram 12).
- (c) Above the enclosures to a protected stairway (see Diagram 11).
- (d) Around all openings (windows, doors, vents, service boxes etc.) in framed construction.

Diagram 11 Roofspaces over protected stairway in dwelling houses (alternative arrangements) Par 3.6.2

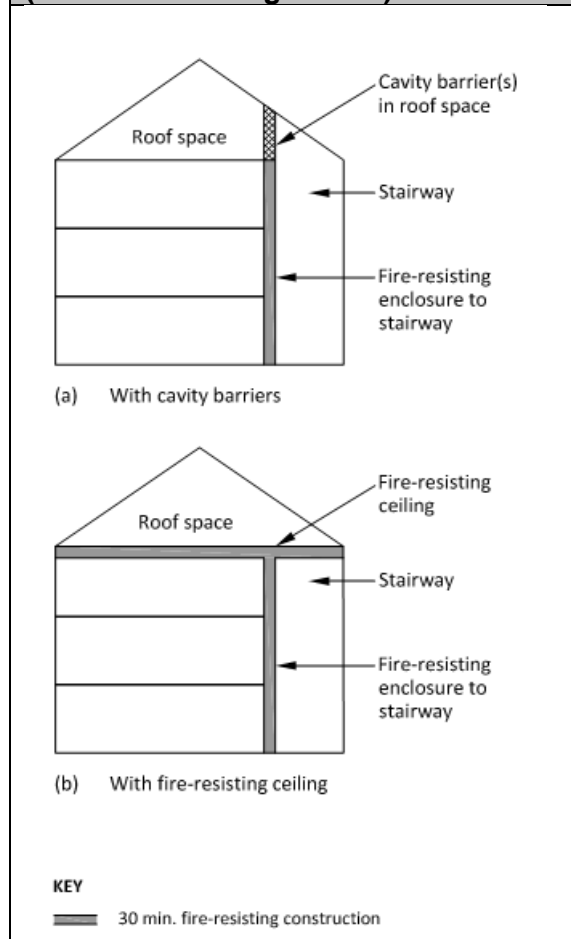
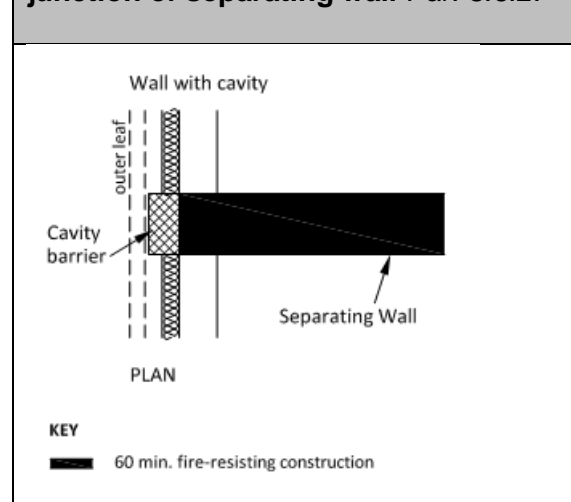


Diagram 12 Vertical cavity barrier at junction of separating wall Par. 3.6.2.



3.6.3 Construction and Fixings for Cavity Barriers

Every cavity barrier should be constructed to provide at least 30 minutes fire resistance (see Appendix A, Table A1, item 10).

Notes:

Any cavity barrier required in framed construction may however be formed of –

- (i) steel at least 0.5 mm thick, or
- (ii) timber at least 38 mm thick, or
- (iii) polythene sleeved mineral wool, or mineral wool slab, in either case under compression when installed in the cavity.

A cavity barrier may be formed by any construction provided for another purpose if it meets the provisions for cavity barriers.

Cavity barriers should be tightly fitted to rigid construction and mechanically fixed in position wherever possible. Where this is not possible (for example, in the case of a junction with slates, tiles, corrugated sheeting or similar materials) the junction should be fire-stopped.

Where cavity barriers are fitted in roof spaces the roof members to which they are fixed do not have to be fire resisting.

Cavity barriers should also be fixed so that their performance is unlikely to be made ineffective by:

- (a) movement of the building due to subsidence, shrinkage or thermal change and movement of the external envelope due to wind;
- (b) collapse in a fire of any services penetrating them;
- (c) failure in a fire of their fixings; or failure in a fire of any material or construction which they abut.

3.6.4 Openings in Cavity Barriers

Any openings in a cavity barrier should be limited to those for:

- (a) the passage of pipes which meet the provisions in sub-section 3.7
- (b) the passage of cables or conduits containing one or more cables.
- (c) ducts which are fire resisting

3.7 Protection of Openings and Fire-Stopping

3.7.1 Introduction

Earlier sections of this Document describe the provision of barriers to fire, and the circumstances in which there may be openings in them. This Section deals with the protection of openings in such barriers. If an element that is intended to provide fire separation (i.e. it has requirements for fire resistance in terms of integrity and insulation) is to be effective, then every joint, or imperfection of fit, or opening to allow services to pass through the element, should be adequately protected by sealing or fire-stopping so that the fire resistance of the element is not impaired. Building service installations should be designed in accordance with BS 8313:1997 (Section 13).

Provisions for door openings and fire doors are given in Appendix B.

Note: The measures are intended to delay the passage of fire. They generally have the additional benefit of retarding smoke spread but the test specified in Appendix A for integrity does not stipulate criteria for the passage of smoke as such.

3.7.2 Openings for Pipes

Pipes which pass through a wall or floors which are required to be fire resisting, or cavity barrier, should meet the appropriate provisions in alternatives A, B or C below.

Note: No pipework should pass through any separating wall (see 3.5.4.4)

Alternative A: Proprietary Seals (any pipe diameter)

Provide a proprietary sealing system which has been shown by test to maintain the fire resistance of the wall, floor or cavity barrier.

Alternative B: Pipes with a restricted diameter

Where a proprietary sealing system is not used, fire-stopping may be used around the pipe, keeping the opening as small as possible. The nominal internal diameter of the pipe should not be more than the relevant dimension given in Table 3.4

Alternative C: Sleeving

A pipe of lead, aluminium, aluminium alloy, asbestos-cement or uPVC, with a maximum nominal internal diameter of 160 mm, may be used with a sleeving of non-combustible pipe extending not less than 1m from the fire resistant element. The specification for non-combustible and uPVC pipes is given in the notes to Table 3.4.

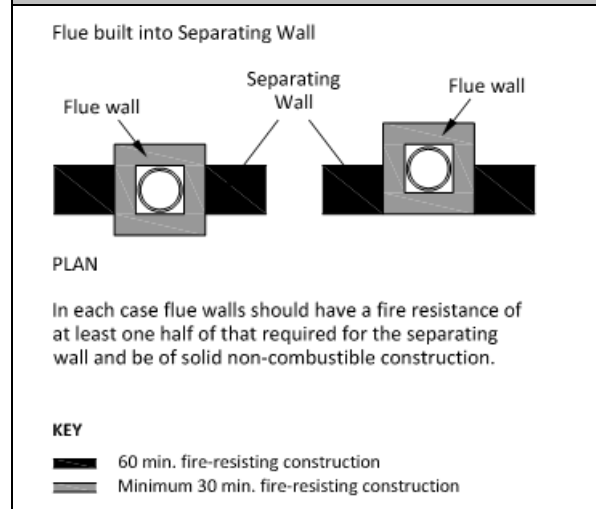
3.7.3 Ventilating Ducts

Where ventilation and air conditioning ducts pass between fire resisting elements (floors, protected stairwells etc.), they should be protected in accordance with the recommendations contained in paragraph 1.3.9.3.

3.7.4 Flues

If a flue, or duct containing flues or appliance ventilation duct(s), passes through a fire resisting wall or fire resisting floor, or is built into a separating wall, the walls of the flue or duct should have a fire resistance of at least half that of the wall or floor in order to prevent the by-passing of the compartmentation (see Diagram 13). The walls enclosing the flue or duct should be of solid non-combustible construction.

Diagram 13 Flues in separating walls
Par 3.7.4



3.7.5 Fire-Stopping

In addition to any other provisions in this document for fire-stopping:

- (a) joints between elements which serve as a barrier to the passage of fire should be fire-stopped; allowing for movement where appropriate.
- (b) all openings for pipes, ducts, conduits or cables to pass through any part of an element which serves as a barrier to the passage of fire should be:
 - (i) kept as few in number as possible, and
 - (ii) kept as small as practicable, and
 - (iii) fire-stopped (which in the case of a pipe or ducts, should allow thermal movement). (see also Section 1, 1.3.9.3)

Table 3.4 Maximum nominal internal diameter of pipes			
Purpose	(a)	(b)	(c)
	Non-combustible Material(1)	Lead, aluminium or aluminium alloy, fibre-cement or uPVC(2)	or any other material
Any situation(3)	160	40	40

Notes:

1. A non-combustible material (such as cast iron or steel) which, if exposed to a temperature of 800°C will neither soften nor fracture to the extent that flame or hot gases will pass through the wall of the pipe.
2. PVCu pipes complying with IS EN 1329-1:2014 ,BS 4514: 2001, and BS 5255: 1989
3. no pipes, wires or other services are allowed to pass through or breach separating walls.(See 3.5.4.4)

3.7.6 Displacement

To prevent displacement, materials used for fire-stopping should be reinforced with (or supported by) materials of limited combustibility in the following circumstances:

- (a) in all cases where the unsupported span is greater than 100 mm, and
- (b) in any other case where non-rigid materials are used (unless they have been shown to be satisfactory by test)

3.7.7 Proprietary Seals

Proprietary sealing systems (including those designed for service penetrations) which have been shown by test to maintain the fire resistance of the wall or other element are available.

Other suitable fire-stopping materials are:

- cement or lime mortar,
- gypsum based plaster,
- cement or gypsum based vermiculite/perlite mixes,
- glass fibre, mineral wool, crushed rock, blast furnace slag or ceramic based products (with or without resin binders)
- intumescent mastics.

These may be used only in situations which are suitable for the particular fire-stopping materials.

3.7.8 Further Guidance

Further information on the generic types of systems available, their suitability for different applications and guidance on test method is given in the Association for Specialist Fire Protection, Red Book:” *Fire Stopping and Penetration Seals for the Construction Industry*”

Guidance on the process of design, installation and maintenance of passive fire protection is available in”*Ensuring best practice for passive fire protection in buildings*” produced by the Association for Specialist Fire Protection (ASFP).

Section 4

External Fire Spread

External fire spread	B9	The external walls and roof of a dwelling house shall be so designed and constructed that they afford adequate resistance to the spread of fire to and from neighbouring buildings.
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4.1 External Fire Spread

4.1.1 General

The purpose of the requirement of Regulation B9 is to ensure that external walls and roofs have adequate resistance to the spread of fire over their external surfaces, and that spread of fire from one building to another is restricted.

4.2 Performance

The requirements of B9 may be met:

- (a) if the external walls are constructed so that the risk of ignition from an external source, and the spread of fire over their surfaces, is restricted by making provision for them to have low rates of spread of flame, and in some cases low rates of heat release,
- (b) if the amount of unprotected area in the side of the building is restricted so as to limit the amount of thermal radiation that can pass through the wall, taking the distance between the wall and the boundary into account, and
- (c) if the roof is constructed so that the risk of spread of flame and/or fire penetration from an external fire source is restricted,

in each case so as to limit the risk of a fire spreading from the building to a building beyond the boundary, or vice versa.

The extent to which this is necessary is dependent on the use of the building, its distance from the boundary and (in some cases) its height.

4.3 Introduction to Provisions

4.3.1 Introduction

The construction of external walls and the separation between buildings to prevent external fire spread are closely related.

The chances of fire spreading across an open space between buildings, and the consequences if it does depend on:

- the size and intensity of the fire in the building concerned;
- the risk it presents to people in the other building(s);
- the distance between the buildings; and
- the fire protection given by their facing sides

Provisions are made in sub-section 4.4 for the fire resistance of external walls, and to limit the susceptibility of the external surface of walls to ignition and to fire spread.

Provisions are made in sub-section 4.5 to limit the extent of openings and other unprotected areas in external walls in order to reduce the risk of fire spread by radiation.

Provisions are made in sub-section 4.6 for reducing the risk of fire spread between and over roofs.

4.4 Construction of External Walls

4.4.1 Introduction

Under Section 3, provisions are made in sub-section 3.4 for internal and external loadbearing walls to maintain their loadbearing function in the event of fire.

Provisions are made in this Section for the external walls of the building to have sufficient fire resistance to prevent fire spread across the relevant boundary. The provisions are closely linked with those for space separation in sub-section 4.5 which sets out limits on the amount of wall area that need not be fire-resisting (termed unprotected area). As the limits depend on the distance of the wall from the relevant boundary, it is possible for some, or all, of the walls to be permitted to have no fire resistance except for any parts which are loadbearing.

External walls are elements of structure and the relevant period of fire resistance (which is specified in Appendix A) depends on the use, height and size of the building concerned, and whether the wall is within 1m of the relevant boundary.

Provisions are also made to restrict the amount of combustible surfaces on buildings that are very close (less than 1m) to the relevant boundary and/or on high buildings. This is in order to reduce the susceptibility of ignition of the surface from an external source, and to reduce the possibility of fire spread up the external face of the building.

4.4.2 Fire Resistance Standard

The external walls of the building should have the appropriate fire resistance given in Appendix A, Table A1, unless they are permitted to form an unprotected area under sub-section 4.5

4.4.3 External Surfaces

The external surfaces of walls should meet the following provisions in dwelling houses:

- (a) less than 15m in height and less than 1m from the relevant boundary (the relevant boundary may be a notional boundary) they should be Class B – s3,d2(European) or Class 0 (National)

-
- (b) less than 15m in height and more than 1m from the relevant boundary: no provisions

- (c) that no significant radiation will pass through any parts of the external wall that have fire resistance.

However, the total amount of combustible material may be limited in practice by the provisions for space separation in par. 4.5.6.

4.4.4 External Wall Construction

The external envelope of a building should not provide a medium for fire spread. The use of combustible materials for cladding framework, or of combustible thermal insulation as an overcladding in drained and/or ventilated cavities, may present such a risk even though the provisions for external surfaces in 4.4.3 (a) or (b) may have been satisfied.

In the case of the outer cladding of a wall with a drained and/or ventilated cavity, the surface of the outer cladding which faces the cavity should also meet the provisions of 4.4.3 (a) or (b)

4.5 Space Separation

4.5.1 Introduction

The provisions in this Section limit the extent of openings and other unprotected areas in the sides of the building (including areas with a combustible surface) which will not give adequate protection against the spread of fire.

The provisions assume:

- (a) that the intensity of the fire is related to the use of the building as a dwelling house.
- (b) that the building on the adjoining site has an identical elevation to the one in question, and is at the same distance from the common boundary; and

4.5.2 Boundaries

The use of the distance to a boundary rather than to another building in measuring the separation distance makes it possible to calculate the allowable proportion of unprotected areas, even where another building does not exist but may do.

A wall should be treated as facing a boundary if the boundary makes an angle with the wall of 80° or less (see Diagram 15).

Usually only the distance to the boundary of the site needs to be considered. The meaning of the term boundary is explained in Diagram 15.

4.5.3 Notional Boundaries

In some circumstances the distances to other buildings on the same site needs to be considered. This should be done by assuming a boundary called a notional boundary between those buildings.

The concept of a notional boundary between two buildings on the same site and the rules that apply are illustrated in Diagram 14.

In general, it is not necessary to consider the separation distance between buildings on the same site unless one of the buildings, whether new or existing, is of Residential Purpose Groups 1(a), 1(b), 1(c) Flats and Maisonettes, 1(d), 2(a) Residential Institutional, 2(b) Other Residential or Assembly and Recreation (Purpose Group 5) use.

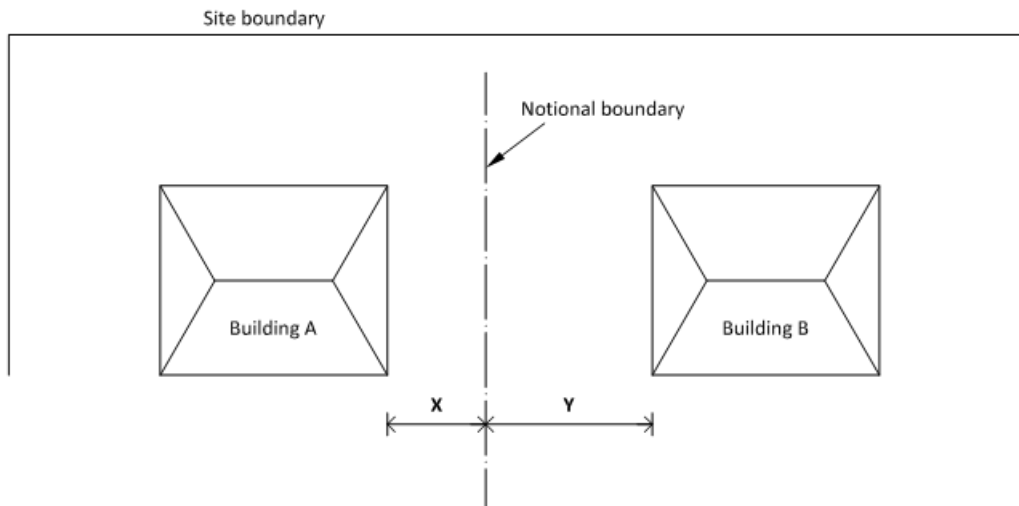
Where a number of buildings of any purpose group occupy the same site and where each building is under different ownership, tenancy or occupancy or where sub-division of the site is likely to occur, it would in these

circumstances be appropriate to consider space separation between all buildings on the same site.

Where buildings of any purpose group occur on the same site and where space separation has not been considered, then it is necessary to take into account the compartmentation requirements under Section 3 (3.5) as if they were connected together as one building.

Diagram 14 Notional Boundary

Pars.4.5.2 and 4.5.3



The notional boundary should be set in the area between the two buildings according to the following rules:

1. These rules only apply when two or more buildings are on the same site and when one of the buildings (new or existing) is of residential or assembly use;
2. A notional boundary should be set between a building of a use given in Rule 1 and another building of any use;
3. An existing building should be taken as if it was a new building of the same use but having the existing unprotected area and fire-resistance on the outside wall facing the notional boundary;
4. The notional boundary should be so situated that all buildings comply with the provisions for space separation, having regard to the amount of unprotected areas;
5. When set the notional boundary becomes the relevant boundary.

Dimension X: Compliance with the provisions for space separation in respect of Building A (in accordance with pars. 4.5.7 and 4.5.8.

Dimension Y: Compliance with the provisions for space separation in respect of Building B (in accordance with pars. 4.5.7 and 4.5.8.

4.5.4 Relevant Boundaries

The boundary which a wall faces whether it is the boundary of the site or a notional boundary is called the relevant boundary (see Diagrams 14 and 15).

4.5.5 Unprotected Areas and Fire Resistance

Any part of an external wall which has less fire resistance than the appropriate amount indicated in Table A1(5) of Appendix A is considered to be an unprotected area

4.5.6 Status of Combustible Surfaces as Unprotected Area

Besides the restrictions on combustible surfaces in 4.4, their extent may also be limited by the result of the calculation of unprotected area if they are more than 1mm in thickness. Then:

- (a) if the combustible material is used as a surface on a wall that has the necessary fire resistance, then half of the area of combustible material should be counted as unprotected area or:
- (b) if the combustible material is used as a surface on a wall that does not have the necessary fire resistance, then the whole of the area of combustible material is counted as unprotected area.

4.5.7 External Walls within 1m of the Relevant Boundary

A wall situated within 1 m from any point on the relevant boundary will meet the provisions for space separation if:

- (a) the only unprotected areas are those shown in Diagram 16 and
- (b) the rest of the wall (if any) is fire resisting.

Diagram 15 Relevant boundary Par 4.5.4

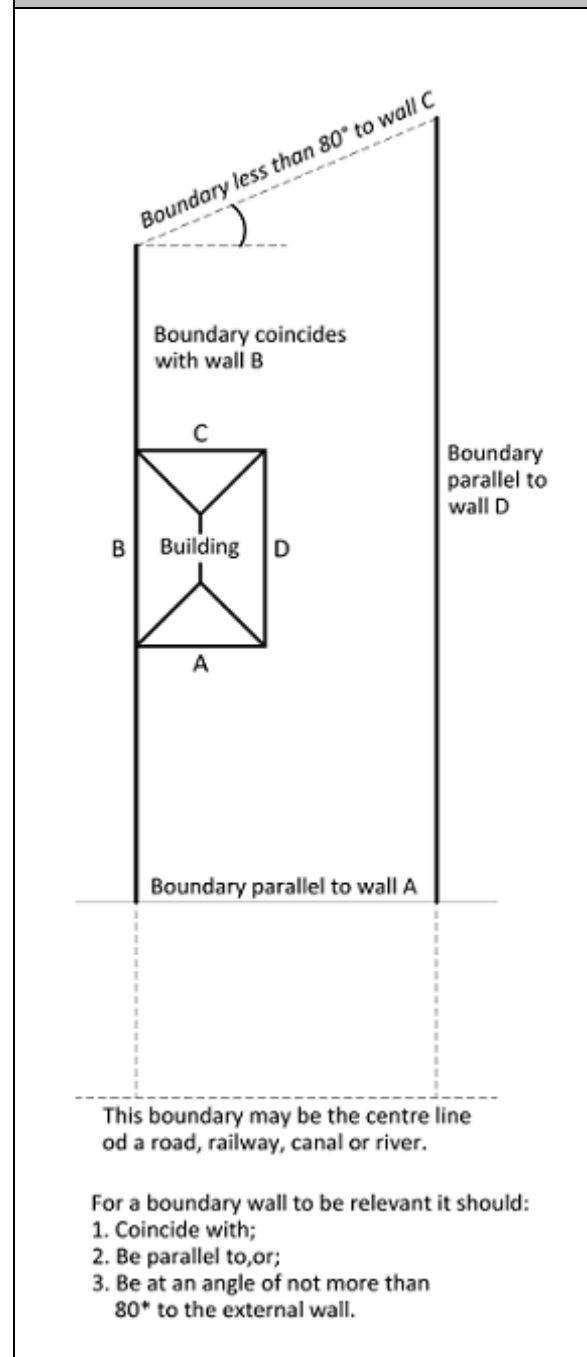
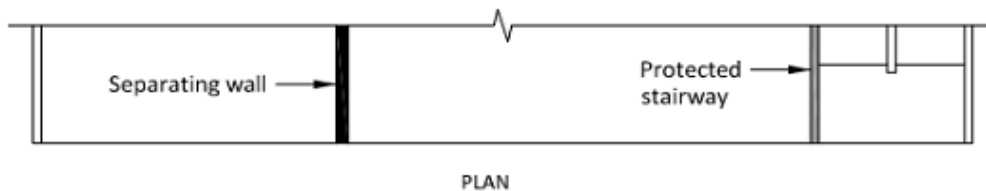
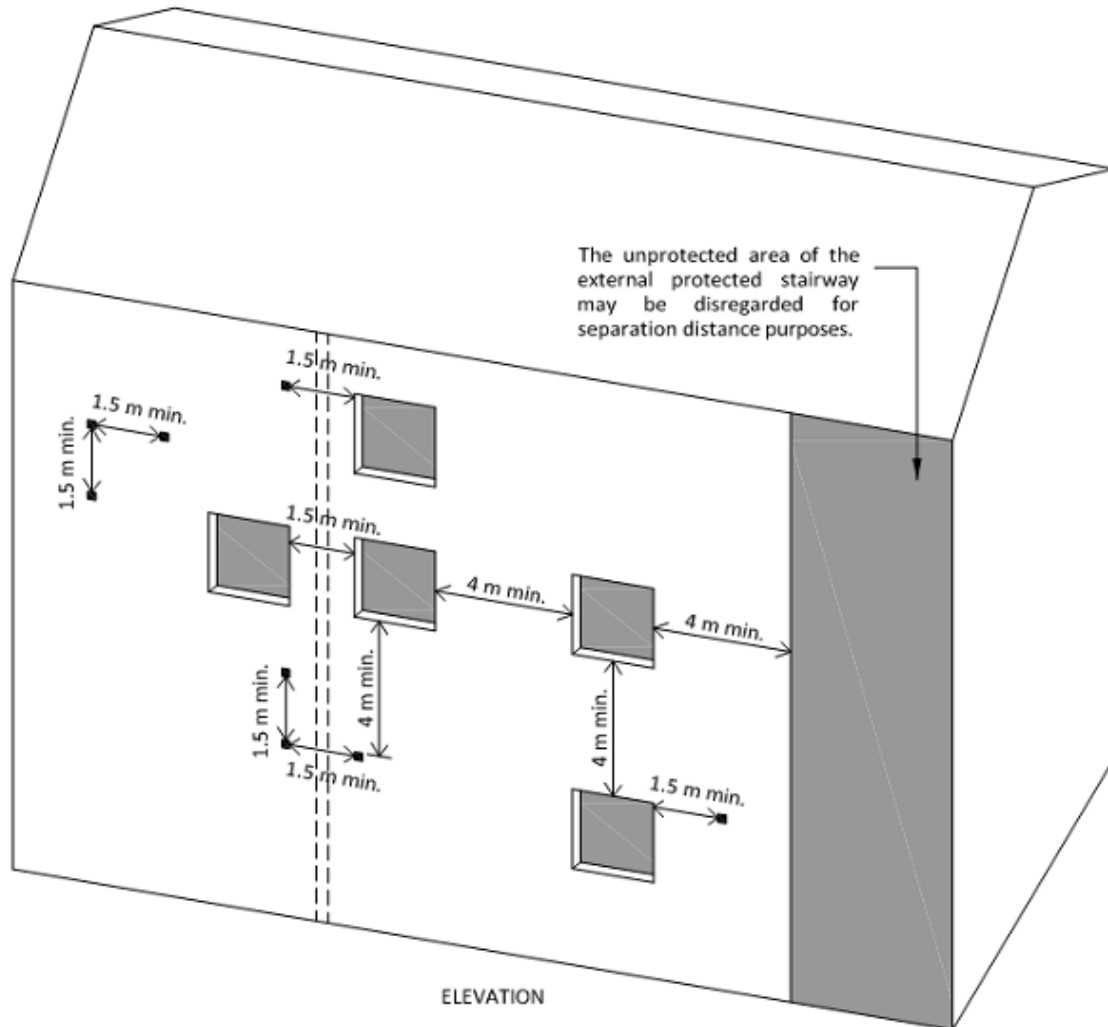




Diagram 16 Unprotected areas which may be disregarded for space separation purposes

Par. 4.5.7



KEY

-  Unprotected area of 1.0m² maximum; or group of unprotected areas within an area of 1m x 1m.
-  Unprotected area of 0.1m² maximum.

Note: Dimensions shown are minimum separation distances between unprotected areas of limited size if those areas are to be disregarded for space separation purposes.

4.5.8 External Walls 1m or more from the Relevant Boundary

A wall situated at least 1m from any point on the relevant boundary will meet the provisions for space separation if:

- (a) the extent of unprotected area does not exceed that given by one of the methods referred to in 4.5.8.2 below, and
- (b) the rest of the wall (if any) is fire-resisting

4.5.8.1 Canopies In the case of a canopy attached to the side of a building, provided that the edges of the canopy are at least 2m from the relevant boundary, separation distance may be determined from the wall (building line) rather than the edge of the canopy (see Diagram 17).

4.5.8.2 Methods for calculating acceptable unprotected area Two methods are given in this Document for calculating the acceptable amount of unprotected area in an external wall that is at least 1 m from any point on the relevant boundary (for walls within 1m of the boundary see 4.5.7 above).

Method 1 (see 4.5.8.3) is only suitable for small dwelling houses which do not belong to Purpose Group 2(a), Residential (Institutional).

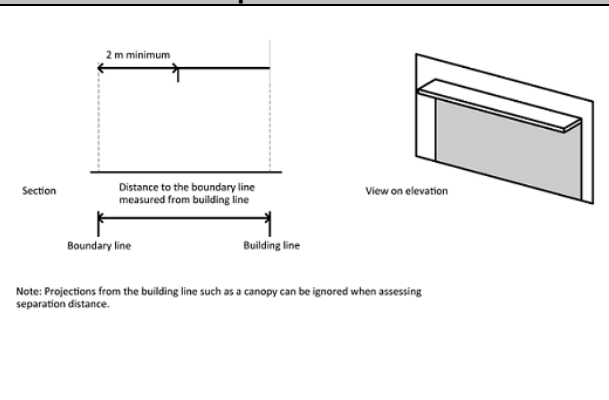
Method 2 (see 4.5.8.4) may be used for buildings or compartments for which Method 1 is not appropriate.

Other methods are described in the Building Research Establishment Report (BR 187) *"External fire spread: building separation and boundary distances"* (2nd edition 2014)

The methods outlined in the BRE report are based on the following:

- enclosing rectangle (geometric method);
- aggregate notional areas (protractor method); and
- Fire engineering approaches (Part 4 of BRE Report)

Diagram 17 The effect of a canopy Par 4.5.8.1 on separation distance



Method 1 Small Dwelling houses

4.5.8.3 This method applies only to a building intended to be used as a dwelling house which is not less than 1m from any point on the relevant boundary. The following rules for determining the maximum permitted unprotected area should be read with Diagram 18 and Table 4.1:

1. The building should not exceed 3 storeys in height (basements not counted) or be more than 24m in length.
2. Each side of the building will meet the provisions for space separation if:

- (a) the distance of the side of the building from the relevant boundary, and
- (b) the extent of unprotected area, are within the limits given in Table 4.1.

Note:

In calculating the maximum permitted unprotected area, any areas shown in Diagram 16 can be disregarded.

- 3. Any parts of the side of the building in excess of the maximum permitted unprotected area should be fire-resisting.

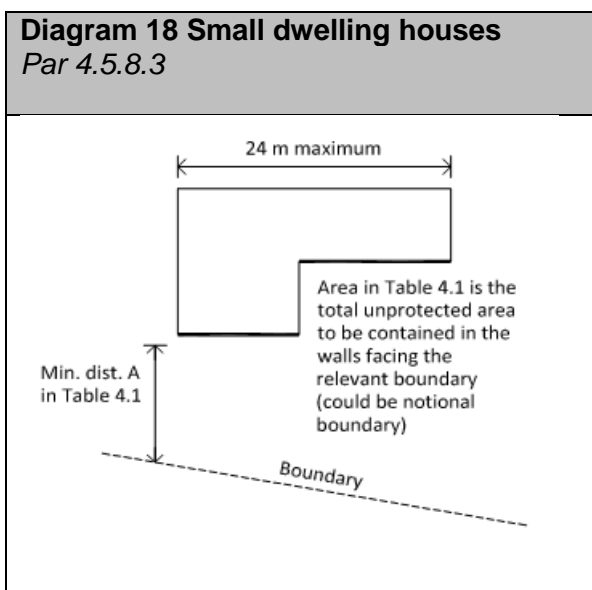


Table 4.1 Permitted unprotected areas in small dwelling houses. Par 4.5.8.3

Minimum distance (A) between side of building and relevant boundary(m)	Maximum total area of unprotected areas (m ²)
1.0	5.6
2.0	12
3.0	18
4.0	24
5.0	30
6.0	No limit

Method 2 Larger Dwelling houses

4.5.8.4 This method applies to a dwelling house not less than 1m from any point on the relevant boundary. The following rules determine the maximum permitted unprotected area and should be read with Table 4.2.

- 1. Each side of the building will meet the provisions for space separation if:
 - (a) the distance of the side of the building from the relevant boundary, and

- (b) the extent of unprotected area,

are within the limits of unprotected area set out in Table 4.2.

Note: In calculating the maximum permitted unprotected area, any areas shown in Diagram 16 can be disregarded.

- 2. Any parts of the side of the building in excess of the maximum permitted unprotected area should be fire-resisting.

Note: For any dwelling house or compartment more than 15m in height, the methods set out in the BRE Report 'Building separation and boundary distances' can be applied.

4.5.9 Material Alteration of Existing Dwelling houses

In the case of a material alteration of an existing dwelling house the requirements in relation to space separation may be met where:

- there is no increase in the extent of unprotected areas to the existing external walls of the building; and

- the building is not altered or extended by the provision of additional floor area(s)

Note:

Where the above criteria are not met, it will be necessary to demonstrate that the unprotected areas comply with the requirements outlined at 4.5.7 or 4.5.8.

4.5.10 Material Change of Use of Existing Buildings

In the case of a material change of use of an existing building to a dwelling house the requirements in relation to space separation may be met where:

- there is no increase in the extent of un-protected areas to the existing external walls of the building; and
- the building is not altered or extended by the provision of additional floor area(s);

Note:

Where either of the above criteria are not met, it will be necessary to demonstrate that the unprotected areas comply with the requirements outlined at 4.5.7 and 4.5.8.

4.5.11 Extensions

Where an extension to an existing dwelling house is proposed the requirements in relation to space separation may be met where: there is no increase in the extent of un-protected areas to the new external walls of the building or the total unprotected area of the new and existing walls of the dwelling house comply with section 4.5.7 or 4.5.8.

Table 4.2 Permitted unprotected areas in larger dwelling houses <i>Par. 4.5.8.4</i>	
Minimum distance between side of building and relevant boundary(m)	Maximum total per cent of unprotected areas (%)
Purpose Groups 1(a), 1(b) and 1(d)	
0	0
2.5	20
5.0	40
7.5	60
10.0	80
12.5	100

Notes:

Intermediate values may be obtained by interpolation.

4.5.12 Increase in extent of unprotected area

Where it is proposed to increase the extent of unprotected areas of a wall on an existing elevation, it may be appropriate to employ insulated fire-resisting glazing in fixed frames or provide other fire resisting construction remote from any existing openings, to provide the necessary protection.

4.6 Roof Coverings

4.6.1 Introduction

The provisions in this sub-section limit the proximity to the boundary of those types of roof covering which will not give adequate protection against the spread of fire.

4.6.2 Other Controls on Roofs

There are provisions concerning the fire properties of roofs elsewhere. In S3, there are provisions in sub-section 3.5 for roofs that pass over the top of a compartment wall or separating wall. In S2, there are provisions for the internal surfaces of rooflights as part

of the internal lining of a room or circulation space.

4.6.3 Classification of Performance

The performance of roof coverings is determined in accordance with I.S. EN 13501-5:2006+A1 2009 *Fire classification of construction products and building elements, Part 5 – Classification using test data from external fire exposure to roof tests* or is designated by reference to the test methods specified in BS 476: part 3: 2004, as described in Appendix A. The notional performance of some common roof coverings is given in table A4 of Appendix A.

I.S. ENV 1187: 2002 Test Methods for external fire exposure to roofs also refers.

Rooflights are controlled on a similar basis, although there is a different method of classification for plastic roof lights, see paragraph 4.6.5.

4.6.4 Separation Distances

The separation distance is the minimum distance from the roof (or part of the roof) in question to the nearest boundary, which may be a notional boundary.

Table 4.3 sets out separation distances according to the type of roof covering and the size and use of the building. However, there are no restrictions on the use of roof coverings designated class BROOF(t4) (European class) or AA, AB or AC (National class).

In addition, roof covering products (and/or materials) as defined in Commission Decision 2000/553/EC of 6th September 2000 implementing Council Directive 89/106/EEC as regards the external fire performance of roof coverings can be considered to fulfil all of the requirements for performance characteristic “external fire performance”

without the need for testing provided that any national provisions on the design and execution of works are fulfilled. That is, the roof covering products (and/or materials) defined in this Commission Decision can be used without restriction.

4.6.5 Plastic Rooflights

Table 4.4 sets out the limitations on the use of plastic rooflights which do not meet the basic provisions described in Table 4.3 but which have a lower surface of thermoplastic material with a TP(a) rigid or TP(b) classification (see A16 of Appendix A).

When used in rooflights, a rigid thermoplastic sheet product made from polycarbonate or from unplasticised PVC, which achieves a class C–s3, d2 (European class) or class 1 (National class) rating for surface spread of flame when tested to BS 476 part 7:1997, can be regarded as having BROOF(t4) (European class) or an AA (National class) designation.

4.6.6 Glass in Rooflights

When used in rooflights, unwired glass at least 4mm thick can be regarded as having BROOF(t4) (European class) or an AA (National class) designation. Thinner glass should only be used where the separation distance is 6m or more, unless the glass is over one of the following:

- (a) a balcony, veranda, open carport, covered way, loading bay or detached swimming pool; or
- (b) a garage, conservatory or outbuilding, with a maximum floor area of 40 m².

Table 4.3 Limitations on roof coverings*		Par. 4.6			
Designation of covering of roof, or part of roof		Minimum distance from any point on relevant boundary			
European Class	National Class	Less than 6 m	At least 6 m	At least 12 m	At least 20 m
$B_{ROOF}(t4)$	AA, AB or AC	✓	✓	✓	✓
$C_{ROOF}(t4)$	BA, BB or BC	x	✓	✓	✓
$D_{ROOF}(t4)$	CA, CB or CC	x	✓(1)	✓(2)	✓
$E_{ROOF}(t4)$	AD, BD or CD	x	✓(1)	✓(2)	✓(2)
$F_{ROOF}(t4)$	DA, DB, DC or DD	x	x	x	✓(1)
	<i>thatch or wood shingles (3)</i>	x	✓(1)	✓(2)	✓(2)

Notes:

* See par. 4.6.6 for limitation on glass and Table 4.4 for limitation on plastic rooflights.

✓ Acceptable

x Not acceptable

✓(1) Not acceptable on any building listed below:

(a) houses in terraces of three or more houses;

(b) any other buildings with a cubic capacity of more than 1500 m³ and only acceptable on other buildings if the part of the roof is no more than 3 m² area and is at least 1.5 m from any similar part, with the roof between the parts covered with a material of limited combustibility.

✓(2) Not acceptable on any of the buildings listed at (a) or (b) in (1) above.

(3) Where the performance under BS 476: Part 3:2004 cannot be established.

Table 4.4 Limitations on plastic rooflights		Par. 4.6.5		
Classification on lower surface ⁽¹⁾	Space which rooflight can serve	Minimum distance from any point on relevant boundary to rooflight with an external surface classification ⁽²⁾ of:		
		TP(a)	TP(b)	F _{ROOF} (t4)(European Class) or DA DB DC DD (National Class)
1. TP(a) rigid	any space except a protected stairway	6 m ⁽³⁾	6 m ⁽⁵⁾	20 m
2. TP(b)	(a) balcony, veranda, carport or covered way which has at least one longer side wholly or permanently open	6 m	6 m	20 m
	(b) conservatory, garage or outbuilding, with a maximum floor area of 40 m ²			
	(c) circulation space ⁽⁴⁾ (except a protected stairway) (d) room ⁽⁴⁾	6 m ⁽⁵⁾	6 m ⁽⁵⁾	20 m ⁽⁵⁾

Notes:

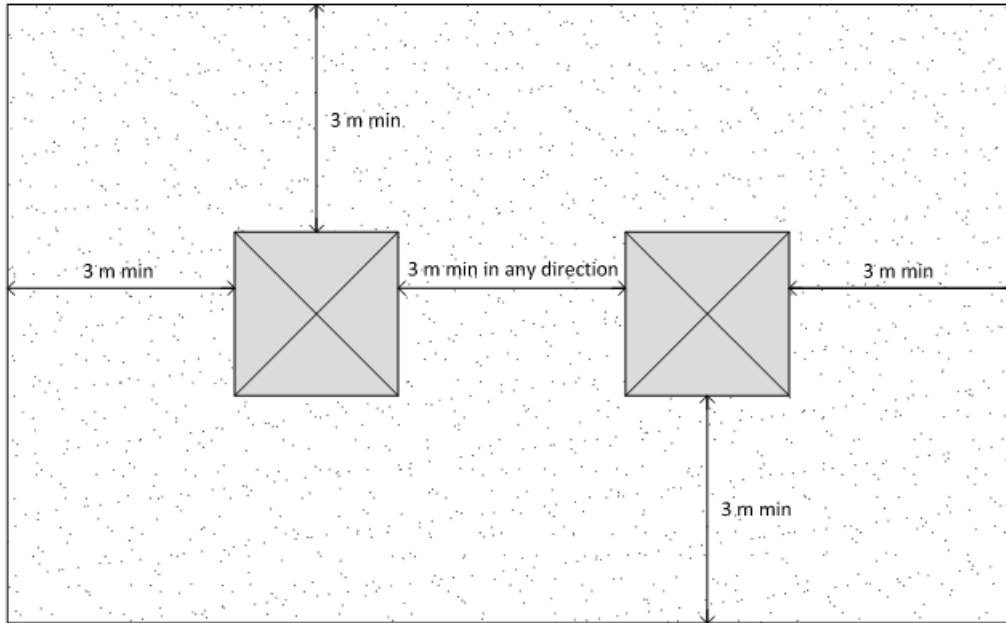
- (1) See also the guidance to Section 2.
- (2) The classification of external roof surfaces is explained in Appendix A.
- (3) No limit in the case of any space described in 2(a) and (b).
- (4) Single skin rooflight only, in the case of non-thermoplastic material.
- (5) The rooflight should also meet the provisions of Diagram 19.

None of the above designations are suitable for protected stairways - (see 2.6.3)

Products may have upper and lower surfaces with different properties if they have double skins or are laminates of different materials.

Diagram 19 Limits on spacing and size of plastic rooflights having a TP(b) lower surface

Table 4.4



KEY



Rooflight or group of rooflights not exceeding 5m²



Roof covering to be a material of limited combustibility

Section 5

Access and Facilities for the Fire Service

Access and facilities for the fire service.	B10	A dwelling house shall be so designed and constructed that there is adequate provision for access for fire appliances and such other facilities as may be reasonably required to assist the fire service in the protection of life and property
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5.1 Access and facilities for the fire service

5.1.1 General

The purpose of the requirement of Regulation B10 is to ensure satisfactory access for fire appliances to buildings and facilities in buildings to assist fire fighters in the protection of life and property.

5.2 Performance

The requirement of B10 may be met:

- (a) if there is sufficient means of external access to enable fire appliances to be brought near to the building for effective use;
- (b) if there is sufficient means of access into, and within, the building for fire-fighting personnel to effect rescue and fight fire;

all to an extent dependent on the use and size of the building.

5.3 Introduction to Provisions

5.3.1 Scope

While the fire safety objectives of Part B relate principally to the protection of life from fire (see 0.1.1), Section 5 relates to measures intended to assist the fire services in the protection of life and property from fire.

Fire authorities have functions under the Fire Services Acts, 1981 and 2003 to provide fire brigades for the extinguishment of fires and for the protection and rescue of persons and property from injury by fire. Regulation B10 provides for the provision of access and other facilities to assist the fire service in the protection of life and property from fire.

The guidance in this Section relates to the provision of facilities for the fire service within and around buildings for the purpose of protecting life and mitigating property damage due to fire.

For dwelling houses, it is usually only necessary to ensure that the building is sufficiently close to a point accessible to fire and rescue service vehicles. For very large dwelling houses additional measures may be necessary. The guidance given in Part B Volume 1 (Buildings other than dwelling houses) may be applicable.

Vehicle access routes and hard-standings should meet the criteria described in 5.4.4 if they are to be used by fire service vehicles.

5.4 Vehicle Access

5.4.1 Introduction

Fire brigade vehicle access to the exterior of a dwelling house is required to enable pumping appliances to supply water and equipment for firefighting.

Access for fire appliances should be provided in accordance with the provisions outlined in 5.4.2 below.

5.4.2 Provision of Vehicle Access

For effective firefighting operations, fire brigade appliances should be able to get within 45 m of the principal entrance to the dwelling house,

5.4.3 Existing Dwelling House

In the case of a material alteration or extension of an existing dwelling house, the requirements of B10 of the Second Schedule to the Building Regulations may be met if the access and facilities for the fire service are not altered in such a way as to reduce the extent or performance of those that existed before the material alteration or extension.

In the case of a material change of use of a building to a dwelling house, it will be necessary to assess the access and facilities for the fire services in accordance with the guidance of the relevant sub-section to this Section.

It may also be prudent to seek advice from the relevant fire authority in relation to such matters

5.4.4 Design of Access Routes and Hard-standings

A vehicle access route may be a public or private road, or other route, which, including any manhole or other covers, meets the standards in Table 5.1 and the following paragraph.

Where access roadways are provided within the site of a dwelling house, turning facilities for appliances, in accordance with the requirements of Table 5.1 should be provided in any dead-end access route that is more than 20m long.

Table 5.1 Vehicle access route specifications						<i>Par. 5.4.4</i>
Appliance type	Minimum width of road between kerbs (m)	Minimum width of gateways between	Minimum turning circle between	Minimum turning circle between	Minimum clearance height (m)	Minimum carrying capacity
Pump	3.7	3.1	16.8	19.2	3.7	12.5

Note:

1. Use of these figures will cater for nearly all of the fire appliances in use at present. Some fire authorities use different sized appliances and it is therefore advisable that the relevant fire authority be consulted.
2. Turning facilities can be a turning circle, a hammerhead, or other point at which a vehicle can turn (see Recommendation for Site Development Works for housing areas.)

5.4.5 Requirements for switches

5.4.5.1 Photovoltaic Panels. Where Photovoltaic (P.V.) panels are provided on buildings, provision should be made for the isolation of the panel array externally in accordance with ET101, 2008.

Appendix A

Performance of Materials and Structures

General

A1 Many of the provisions in this Document are given in terms of performance in relation to standard methods of tests identified below.

In such cases the material, product or structure should:

- (a) be shown by test to be capable of meeting that performance, or
- (b) have been assessed, analysed and appraised as meeting that performance (for this purpose, competent persons, laboratories accredited for conducting the relevant test, and other approving bodies might be expected to have the necessary expertise).

For materials/products where European standards or approvals are not yet available and for a transition period after they become available, National Standards may continue to be used. Where European product standards or approvals are available, any body notified to the European Commission as competent to assess such materials or products against the relevant European standards or technical approval can be considered to have the appropriate expertise. (Refer to :New Approach Notified and Designated Organisations(NANDO)) or

- (c) where tables of notional performance are included in this Document, conform with an appropriate specification given in these tables, or
- (d) in the case of fire-resisting elements, conform with an appropriate specification given in Part II of the Building Research Establishments' Report (BR 128) 'Guidelines for the construction of fire-resisting structural elements' .

For buildings designed in accordance with the Eurocodes, the performance specified must be achieved when tested in accordance with the European test methods .

For existing buildings the performance may be achieved by reference to the test methods set out in BS 476.

A2 Building Regulations deal with fire safety in buildings as a whole and they are aimed at limiting fire hazard. The aim of standard fire tests is to measure or assess the response of a material, product, structure or system to one or more aspects of fire behaviour. Standard fire tests cannot normally measure fire hazard. They form only one of a number of factors that need to be taken into account. Other factors include those set out in this Technical Guidance Document.

Fire Resistance

A3 Factors having a bearing on fire resistance, that are considered in this document, are:

- (a) fire severity,
- (b) building height, or depth,
- (c) building occupancy, and
- (d) intervention by fire fighters.

A4 The standards of fire resistance given 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 the same for buildings in the same use. In the simplest terms, the concentration of combustible material indicates the maximum temperature to which construction elements may be heated

From estimates of the amount of combustible material per unit of floor area in various types of building (the fire load density), which were

made for the Post-War Building Study No. 20 on the Fire Grading of Buildings, minimum standards have been devised for fire resistance. In this Technical Guidance Document, these basic standards have been modified according to particular features of the building affecting the risk to life, which are:

- (a) height of the top floor above ground, which affects the ease of escape and of fire fighting operations, and the consequences should large scale collapse occur;
- (b) occupancy, which reflects the ease with which the building can be evacuated quickly;
- (c) basements, where the lack of an external wall through which to vent heat and smoke may increase heat build-up as well as complicating fire-fighting, thereby prolonging the fire; and
- (d) single storey construction, where escape is direct and structural failure is unlikely to precede evacuation.

Because the use of buildings is subject to change, a precise estimate of fire severity based on the fire load due to a particular use may be misleading. A fire engineering approach of this kind must show a suitable factor of safety, to cater for these possible variations in fire load.

Fire Resistance Performance

A5 Performance in terms of the fire resistance to be met by elements of structure, doors and other forms of construction is determined by reference to either;

- (a) Commission Decision 2003/629/EC of 27th August 2003 amending Commission Decision 2000/367/EC of 3rd May 2000 implementing the

Council Directive 89/106/EEC as regards the classification of the resistance to fire performance of construction products, construction works and parts thereof and any subsequent amendments, fire resisting elements tested to the Relevant European suite of test methods: IS EN 1364, IS EN1365, IS EN1366, IS EN 1636 or

- (b) (National tests) BS 476: Parts 20-24: 1987 (or to BS 476 Part 8:1972 in respect of items tested or assessed prior to 1st January 1988).

All products are classified in accordance with: I.S. EN 13501-2:2016, Fire classification of construction products and building elements, Part 2 - Classification using data from fire resistance tests (excluding products for use in ventilation systems).

I.S. EN 13501-3:2005+A1:2009 Fire classification of construction products and building elements, Part 3 - Classification using data from fire resistance tests on components of normal building service installations (other than smoke control systems).

I.S. EN 13501-4:2007+A1:2009 Fire classification of construction products and building elements, Part 4 - Classification using data from fire resistance tests on smoke control systems.

Table A1 gives the specific requirements for each element in terms of the three following performance criteria (provisions for fire doors are set out in Appendix B, Table B1):

- (a) resistance to collapse (loadbearing capacity), which applies to loadbearing elements, denoted R in the European classification of the resistance to fire performance

- (b) resistance to fire, smoke and hot gases penetration (integrity), which applies to fire separating elements, denoted E in the European classification of the resistance to fire performance; and
- (c) resistance to the transfer of excessive heat (insulation), which applies to fire separating elements, denoted I in the European classification of resistance to fire performance.

Table A1 also sets out the minimum periods of fire resistance for elements of structure.

Table A2 sets out criteria appropriate to the suspended ceilings that can be accepted as contributing to the fire resistance of a floor.

Table A3 sets out limitations on the use of uninsulated fire-resisting glazed elements.

Information on tested elements is frequently given in literature available from manufacturers and trade associations. Any reference used to substantiate the fire resistance rating of a construction should be carefully checked to ensure that it is suitable, adequate and applicable to the construction to be used. Small differences in detail (such as fixing method, joints, dimensions, etc.) may significantly affect the rating.

Fire resisting elements of construction should be strictly in accordance with the specification and method of construction which, by the criteria indicated at A1, can be shown to be capable of meeting the required performance. Fire resisting elements of construction should not incorporate any components, such as building services, which could compromise their fire resistance performance.

Any openings for services which pass through fire resisting construction should be adequately protected and fire stopped to ensure that the fire resistance of the element

is not impaired (see 3.7). Care and attention to detail should also be taken at the junctions between fire resisting elements of construction to ensure that the integrity of the fire resistance is maintained.

Roofs

A6 Performance in terms of the resistance of roofs to external fire exposure is determined by reference to either:

- (a) (Commission Decisions 2005/823/EC amending Decision 2001/671/EC of 22nd November 2005 establishing a classification system for the external fire performance of roofs and roof coverings and any subsequent amendments ;or
- (b) I.S. ENV 1187: 2002; or
- (c) (National tests) BS 476: part 3: 2004

All constructions are classified within the European system as BROOF(t4), CROOF(t4), DROOF(t4), EROOF(t4) or FROOF(t4) (with BROOF(t4) being the highest performance and FROOF(t4) being the lowest) in accordance with I.S. EN 13501-5:2005+A1:2009, Fire classification of construction products and building elements, Part 5 – Classification using test data from external fire exposure to roof tests.

Roof covering products (and/or materials) can be considered to fulfil all of the requirements for the performance characteristic “external fire performance” without the need for testing if they are listed in Commission Decision 2000/553/EC of 6th September 2000 implementing Council Directive 89/106/EEC as regards the external fire performance of roof coverings.

Commentary - *All constructions are classified within the National system by 2 letters in the range A to D, with an AA designation being the best. The first letter indicates the time to penetration and the*

second letter a measure of the spread of flame.

Table A4 gives notional designations of some generic roof coverings.

Reaction to fire

A7 Performance in terms of reaction to fire to be met by construction products is determined by Commission Delegated Regulation (EU) 2016/364 of the 1st July 2015 and any subsequent amendments. All products, excluding floorings, are classified as A1, A2, B, C, D, E or F (with class A1 being the highest performance and F being the lowest) in accordance with I.S. EN 13501-1:2007+A1:2009 Fire classification of construction products and building elements, Part 1-Classification using data from reaction to fire tests.

The relevant European test methods are specified as follows;

I.S. EN ISO 1182: 2010 Reaction to fire tests for building products - Non-combustibility test.

I.S. EN ISO 1716: 2010 Reaction to fire tests for building products - Determination of the gross calorific value.

I.S. EN 13823: 2010 Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.

I.S. EN ISO 11925 - 2: 2010 Reaction to fire tests for building Products, Part 2 - Ignitability when subjected to direct impingement of a flame.

I.S. EN 13238:2010 +A7 2014 Reaction to fire tests for building products - conditioning procedures and general rules for selection of substrates.

Note: The classes of reaction to fire performance of A1, A2, B, C, D and E are

accompanied by additional classifications related to the production of smoke (s1, s2, s3, with s1 being the highest performance) and/or flaming droplets/particles (d0, d 1, d2, with d0 being the highest performance).

Internal Linings

A8 Flame spread over wall or ceiling surfaces is controlled by providing for the lining materials or products to meet given performance levels in tests appropriate to the materials or products involved.

A9 Under the European classifications, lining systems are classified in accordance with I.S. EN 13501-1:2007+A1:2009, Fire classification of construction products and building elements, Part 1 - Classification using data from reaction to fire tests. Materials or products are classified as A1, A2, B, C, D, E or F with A1 being the highest. When a classification includes “s3, d2”, it means that there is no limit set for smoke production and/or flaming droplets/particles.

Under the National classifications, lining systems which can be effectively tested for 'surface spread of flame' are rated for performance by reference to the method specified in BS 476: Part 7: 1971 or 1987 under which materials or products are classified 1, 2, 3 or 4 - with Class1 being the highest (Class 4 ratings are not acceptable under the provisions in this document).

A10 The European reaction to fire classification system is based on the principle that construction products should be tested in the I.S. EN 13823 test in a manner that is representative of their “end use” application. This means that realistic jointing and fixing arrangements should be included within the specimens that are tested. It is important to recognise this fact since as a consequence, a construction product may have several different European reaction to fire classes depending upon its “end use” application. Clearly, for many construction products there are a large number of combinations and

variations possible. Where European Technical Specifications for products have been published or are being developed, guidance on appropriate reaction to fire test arrangements should be available. However, for those products for which no specific guidance exists, general guidance is available in I.S CEN/TS 15447(2006), Technical Specification “Mounting and fixing in reaction to fire tests under the CPD”.

A11 To restrict to a minimum the use of materials which ignite easily, have a high rate of heat release and/or which reduce the time to flashover, maximum acceptable 'fire propagation' indices are specified. These are determined by reference to the method specified in BS 476: Part 6: 1981 or 1989. Index of performance (I) relates to the overall test performance, where sub-index (11) is derived from the first three minutes of test.

A12 The highest product performance classification is Class 0. This is achieved if a material or the surface together with its substrate of a composite product is either:

- (a) composed throughout of materials of limited combustibility (see A18), or
- (b) a Class 1 material which has a fire propagation index (I) of not more than 12 and sub-index (11) of not more than 6.

Note: Class 0 is not a classification identified in any Standard test.

A13 No thermoplastic material in isolation can be assumed to protect a surface underlying it. The surface rating of both products must 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 will need to comply.

A14 Composite products defined as materials of limited combustibility (see A18) in Table A6 should in addition comply with the test requirement appropriate to any surface rating specified in Sections 2, 3 and 4.

A15 The notional performance ratings of certain widely-used generic materials or products are listed in Table A5 in terms of their performance in the traditional lining tests (BS 476: Parts 6 and 7) or in accordance with I.S. EN 13501-1:2007+A1;2009, Fire classification of construction products and building elements, Part 1- Classification using data from reaction to fire tests.

Note: Information on tests on proprietary materials is frequently given in literature available from manufacturers and trade associations.

Any reference used to substantiate the surface spread of flame rating of a material or product should be carefully checked to ensure that it is suitable, adequate and applicable to the construction to be used. Small differences in detail, such as thickness, substrate, fixings, adhesive etc., may significantly affect the rating.

A16 A thermoplastic material means any polymeric material which has a softening point below 200°C if tested to BS 2782: Part 1: Method 120A: 1990. Specimens for this test may be fabricated from the original polymer where the thickness of material of the end product is less than 2.5 mm.

For the purposes of Sections 2 and 4 thermoplastic materials should be used according to the performance set out in A8 and A9 above or be classified as TP (a) or TP (b) as follows:

TP (a) rigid:

- (i) Rigid solid pvc sheet;

-
- (ii) solid (as distinct from double - or multiple-skin) polycarbonate sheet at least 3 mm thick;
 - (iii) multi-skinned rigid sheet made from unplasticised pvc or polycarbonate which has Class 1 rating when tested to BS 476: Part 7:1971 or 1987;
 - (iv) any other rigid thermoplastic product, a specimen of which, when tested to BS 2782: 1970 as amended in 1974: method 508A, performs so that the test flame extinguishes before the first mark, and the duration of flaming or afterglow does not exceed 5 seconds following removal of the burner.

TP (b):

- (i) Rigid solid polycarbonate sheet products less than 3 mm thick, or multiple skin polycarbonate sheet products which do not qualify as TP(a) by test; or
- (ii) Other products which, when a specimen of the material between 1.5 and 3 mm thick is tested in accordance with BS 2782: 1970, as amended in 1974: method 508A, has a rate of burning which does not exceed 50 mm/minute (if it is not possible to cut or machine a 3 mm thick specimen from the product then a 3 mm test specimen can be moulded from the same material as that used for the manufacture of the product); and
- (iii) the product, when ignited, does not produce burning droplets which could contribute to the spread of fire within a building.

A17 Concessions are made for thermoplastic materials used for windows, rooflights and within suspended ceilings if they cannot be

tested as specified in pars. A9 , A10 and A11. They are described in Sections 2 and 4.

Materials of Limited Combustibility

A18 Materials of limited combustibility are defined in Table A6,

- (a) (European classes) in terms of performance when classified as class A2-s3, d2 in accordance with I.S. EN 13501-1:2007+A1:2009 , Fire classification of construction products and building elements, Part 1 - Classification using data from reaction to fire tests when tested to I.S. EN ISO 1182: 2002, Reaction to fire tests for building products - Non combustibility test or I.S. EN ISO 1716: 2002 Reaction to fire tests for building products - Determination of the gross calorific value and I.S. EN 13823: 2002 Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item or

(b)(National classes) by reference to the method specified in BS 476: Part 11: 1982

(c)(National classes) Table A6 also includes composite products (such as plasterboard) which are considered acceptable, and where they are exposed as linings they should also meet any appropriate flame spread rating.

Non-combustible Materials

A19 Non-combustible materials are defined in Table A7 either as listed products, or in terms of performance;

- (a)(European classes) when classified as class A1 in accordance with I.S. EN 13501-1:2007+A1:2009, Fire classification of construction products

and building elements, Part 1 - Classification using data from reaction to fire tests when tested to I.S. EN ISO 1182: 2002, Reaction to fire tests for building products - Non combustibility test and I.S. EN ISO 1716: 2002 Reaction to fire tests for building products - Determination of the gross calorific value or

(b)(National classes) when tested to BS 476: Part 4: 1970 or Part 11: 1982.

Only non-combustible materials may be used where there is a provision for non-combustibility and also for the specific application in the elements listed in Table A7. Non-combustible materials may be used whenever there is a requirement for materials of limited combustibility.

Fire Test Methods

A20 A guide to the various test methods in BS 476 and BS 2782 is given in PD 6520:1988 (BSI)

A guide to the development and presentation of fire tests and their use in hazard assessment is given in BS 6336:1998

Structural Fire Design

A21 The Eurocodes are a set of harmonised European structural design codes for building and civil engineering works and are produced by CEN (European Committee for Standardisation).

There are 10 Eurocodes made up of 58 Parts. Each Part is implemented nationally with a National Annex. These Annexes contain information on Nationally Determined Parameters to be used for the design of building and civil engineering works to be constructed addressing for example particular national safety parameters, geographical and climatic conditions, and procedures.

Irish National choices are contained in the Irish National Annex or National Foreword to each Part. Therefore, any reference to the Eurocodes must be taken to include reference to the relevant Irish National Annex.

Attention is drawn to the fire parts of the Structural Eurocodes

I.S. EN 1991-1-2:2002,
I.S. EN 1992-1-2:2004,
I.S. EN 1993-1-2:2005,
I.S. EN 1994-1-2:2005,
I.S. EN 1995-1-2:2004,
I.S. EN 1996-1-2:2005,
I.S. EN 1999-1-2:2007

which present a range of options for the designer ranging from prescriptive rules based on standard fire resistance periods and the use of tabulated data, to calculation procedures based on a natural fire exposure and whole building behaviour.

When assessing existing structural elements in existing dwelling houses guidance on the design for different structural materials is contained in Part 1 of the Building Research Establishment Report (BR 128) "Guidelines for the construction of fire-resisting structural elements"

Table A1 Specific provisions of test for fire resistance of elements of structure, etc in Dwelling Houses

	Part of building	Minimum provisions when tested to the relevant (7) European standard (minutes)	Minimum provisions when tested to relevant parts of BS 476 (1) (minutes)			Method of exposure
			Loadbearing capacity (2)	Integrity	Insulation	
1	Structural frame , beam or column	R30	30	No provision	No Provision	Exposed faces
2	Loadbearing wall (which is not also a wall described in any of the following items)	R30	30	No provision	No provision	each side separately
3	Floors					
	(a) floor in upper storey of a 2 storey dwelling house (but not over a garage)	R 30, REI 15	30	15	15	from underside (3)
	(b) any other floor including compartment or basement floors	REI 30	30	30	30	from underside (3)
4	Roofs Any part forming an escape route	REI 30	30	30	30	from underside (3)
5	External walls (a) any part less than 1 m from any point on relevant boundary (b) any part 1m or more from the relevant boundary	REI30 RE30 REI 15	30 30	30 30	30 15 (4)	each side separately from inside
6	Separating wall (5)	REI (min 60)	(min 60)	(min 60)	(min 60)	each side separately
7	Enclosure					
	(a) protected stairway	REI 30(6)	30	30	30 (6)	Each side separately
8	Wall separating an attached or integral garage from a dwelling house	REI 30 (6)	30	30	30	from garage side
9	Fire-resisting construction not described elsewhere.	REI 30 (6)	30	30	30 (6)	each side separately
10	Cavity barrier	EI 15, E30	No provision	30	15	each side separately
11	Ceiling described in Diagram 9	EI 30	N/A	30	30	from underside
12	Duct described in Section 3, paragraph 3.7.3	E30	N/A	30	No provision	from outside
13	Flue walls described in 3.7.4 and Diagram 11	EI5	N/A	15	15	from outside
14	Fire doors	See Table B1 of Appendix B				

Notes

N/A Denotes that provision is not applicable.

- (1) BS 476 Part 21 for loadbearing elements, Part 22 for non-loadbearing elements, Part 23 for fire-protecting suspended ceilings; and Part 24 for ventilation ducts (tests to BS 476: Part 8 are permitted subject to paragraph A5).
- (2) Applies to loadbearing elements only.
- (3) A suspended ceiling should only be relied on to contribute to the fire resistance of the floor if the ceiling meets the appropriate provisions given in Table A2.
- (4) 30 mins. for any part adjacent to an external escape route (but no provision for glazed elements in respect of insulation).
- (5) See Section S3, 3.5.4 for requirements for construction of separating walls.
- (6) Except for any limitations on glazed elements given in Table A3.
- (7) The National classifications do not automatically equate with the equivalent classifications in the European column, therefore products cannot typically assume a European class unless they have been tested accordingly.

R is the European classification of the resistance to fire performance in respect of loadbearing capacity
E is the European classification of the resistance to fire performance in respect of integrity, and
I is the European classification of the resistance to fire performance in respect of insulation.

Application of the Fire Resistance Standards in Table A1

Where 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).

There are circumstances where it may be reasonable to vary this principle, for example:

- (i) where the supporting structure is in the open air; or
- (ii) Where an element of structure forms part of more than one building or compartment, that element should be constructed to the standard of the greater of the relevant provisions.

Although some elements of structure in a single storey building may be excluded from needing fire resistance (see Section 3 Par.3.4.4) fire resistance will be needed if the element:

- (i) is part of (or supports) an external wall and there is provision in Section 4 to limit the extent of openings and other unprotected areas in the wall: or
- (ii) is part of (or supports) a compartment wall, a separating wall or a wall between a dwelling house and an attached or integral garage; or
- (iii) supports a gallery.

For the purposes of this paragraph, the ground storey of a building which has one or more basement storeys and no upper storeys, may be considered as single storey.

The fire resistance of the basement storeys should be that appropriate to basements.

Where one side of a basement is (due to the slope of the ground) open at ground level, giving an opportunity for smoke venting and access for fire fighting, it may be appropriate to adopt for elements of structure in that storey, the standard of fire resistance applicable to above ground structure.

Table A2 Limitations on fire-protecting suspended ceilings			
Height of building or of separated part (m)	Type of floor	Provisions of fire resistance of floor (mins)	Description of suspended ceiling
Less than 15	not compartment	60 or less	Surface of ceiling exposed to the cavity should be Class C-s3, d2 or better (European) or Class O or Class 1 (National).

Notes:

Any insulation above the ceiling should be of a material of Class A2-s3, d2 or better (European) or of limited combustibility (National).

The National classifications do not automatically equate with the equivalent European classifications, therefore products cannot typically assume a European class unless they have been tested accordingly.

When a classification includes “s3, d2”, this means that there is no limit set for smoke production and/or flaming droplets/particles.

Table A3 Limitations on the use of uninsulated fire resisting glazed elements on escape routes					
	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
1.	Dwelling House	Fixed fanlights only	Unlimited	Fixed fanlights only	Unlimited
	(a) within the enclosures to a protected stairway or within fire-resisting construction shown in Diagram 2				

Table A4 Notional designations of roof coverings			
Part I: Pitched roofs covered with slates or tiles			
	Covering Material	Supporting Structure	Designation
1.	Natural slates	1. Timber rafters with or without underfelt, sarking, boarding, wood wool slabs, plywood, wood chipboard, or fibre insulating board	BROOF(t4) (European class) or AA (National class)
2.	Fibre-cement slates		
3.	Clay tiles		
4.	Concrete tiles		
5.	Strip slates of bitumen felt Class 1 or 2	2. Timber rafters and boarding, plywood, wood wool slabs, compressed straw slabs, wood chipboard, or fibre insulating board	DROOF(t4) (European class) or CC (National class)
6.	Bitumen felt strip slates Type 2E, with underlay of bitumen felt Type 2B	3. Timber rafters and boarding, plywood, wood wool slabs, compressed straw slabs, wood chipboard or fibre insulating board	CROOF(t4) (European class) or BB (National class)

Table A4 Notional designations of roof coverings			
Part II: Pitched roofs covered with pre-formed self-supporting sheets			
Material	Construction	Supporting Structure	Designation
Profiled sheets of	1. single skin without underlay or with underlay of -	structure of timber, steel or concrete	BROOF(t4) (European class) or AA (National Class)
(i) galvanised steel	(i) plasterboard		
(ii) aluminium	(ii) fibre insulating board		
(iii) fibre reinforced cement	(iii) wood wool slab		
(iv) pvc coated steel			
Profiled sheets of:	2. double skin without underlay or with underlay of -	structure of timber, steel or concrete	DROOF(t4) (European class or AA (National Class)
(i) galvanised steel	(i) resin-bonded glass fibre		
(ii) aluminium	(ii) bitumen-bonded glass fibre		
(iii) composite steel and fibre-cement	(iii) mineral wool slab or blanket		
(iv) fibre-cement or	(iv) polystyrene or		
(v) pvc coated steel	(v) polyurethane		

Table A4 Notional designations of roof coverings			
Part III: Pitched or flat roofs covered with fully supporting material			
	Covering Material	Supporting Structure	Designation
1.	Aluminium sheet	1. Timber joists and (i) tongued and grooved boarding, or (ii) plain edged boarding	BROOF(t4)* (European class) or AA* (National Class)
2.	Copper sheet		
3.	Zinc sheet		
4.	Lead sheet		
5.	Mastic asphalt	2. Steel or timber joists with deck of: (i) wood wool slab (ii) compressed straw slab (iii) wood or flax chipboard (iv) fibre insulating board, or (v) 9.5 mm plywood	BROOF(t4) (European class) or AA (National Class)
6.	Vitreous enamelled steel sheet		
7.	Lead/tin alloy coated steel sheet		
8.	Zinc/aluminium alloy coated steel sheet		
9.	Pre-painted (coil coated) steel sheet including liquid-applied pvc coating		
		3. Concrete or clay pot slab (cast in situ or precast), or non-combustible deck of steel, aluminium or fibre-cement (with or without insulation)	BROOF(t4) (European class) or AA (National Class)

Note:* Lead sheet supported by timber joists and plain edge boarding is deemed to be designated class CROOF(t4) (European class) or BA (National class).

Table A4 Notional designations of roof coverings

Part IV(A): Flat roofs covered with bitumen felt

A flat roof comprising a covering of bitumen felt shall (irrespective of the felt specification) be deemed to be of class BROOF(t4) (European class) or AA (National class) if the felt is laid on a deck constructed of any of the materials prescribed in the Table in Part IV(B) and has a surface finish of;

- (a) bitumen bedded stone chippings covering the whole surface to a depth of not less than 12.5 mm
- (b) bitumen bedded tiles of a non-combustible material
- (c) sand and cement screed or
- (d) macadam

Table A4 Notional designations of roof coverings

Part IV(B): Pitched roofs covered with bitumen felt

Number of layers	Type of upper layer	Type of under-layer(s)	Deck of either of the following (having minimum thickness stated) plywood (6mm), wood chipboard (12.5mm), T&G boarding (16mm finished) or Plain edged boarding (19mm finished)	Deck of compressed straw slab	Deck of screeded woodwool slab	Fibre-cement or steel single or double skin deck (without overlay or with overlay of fibre insulating board)	Aluminium single or double skin deck (without overlay or with overlay of fibre insulating board)	Concrete or pot slab (cast in situ or precast)
Two or three layers built up in accordance with BS 8217:2005 Reinforced bitumen membranes for roofing. Code of practice	1. Type 1E	Type 1B (minimum mass 13kg/10m ²)	DROOF (t4) (European class) or CC (National class)	BROOF(t4) (European class) or AC (National class)	BROOF(t4) (European class) or AC (National class)	BROOF(t4) (European class) or AC (National class)	BROOF(t4) (European class) or AC (National class)	BROOF(t4) (European class) or AB (National class)
	2. Type 2E	Type 1B (minimum mass 13kg/10m ²)	CROOF (t4) (European class) or BB (National class)	BROOF(t4) (European class) or AB (National class)	BROOF(t4) (European class) or AB (National class)	BROOF(t4) (European class) or AB (National class)	BROOF(t4) (European class) or AB (National class)	BROOF(t4) (European class) or AB (National class)
	3. Type 3E	Type 3B or 3G	CROOF (t4) (European class) or BC (National class)	BROOF(t4) (European class) or AC (National class)	BROOF(t4) (European class) or AB (National class)	BROOF(t4) (European class) or AB (National class)	BROOF(t4) (European class) or AB (National class)	BROOF(t4) (European class) or AB (National class)

Note:

Any reference in this Table to bitumen felt of a specified type is a reference to bitumen felt as so designated in I.S. 36: Part 1: 1986 and Part 2: 1987.

Table A5 Typical performance ratings of some generic materials and products			
European Rating	Material or Product	National Rating	Material or Product
Class A1	1. Any material that achieves this class when tested in accordance with I.S. EN 1350 1-1 or is class A1 without need for testing (see table A8) or is within this class in Commission Decision 2003/43/EC of 17th January 2003 establishing the classes of reaction to fire performance for certain construction products and any subsequent amendments.		
Class A2-s3, d2	2. Any material or product that achieves this class when tested in accordance with I.S. EN 13501-1 or any construction product with this class in Commission Decision 2003/43/EC of 17th January 2003 establishing the classes of reaction to fire performance for certain construction products and any subsequent amendments		
Class B-s3, d2	3. Any material or product that achieves this class when tested in accordance with I.S. EN 13501-1 or any construction product with this class in Commission Decision 2003/43/EC of 17th January 2003 establishing the classes of reaction to fire performance for certain construction products and any subsequent amendments	Class 0	6. Any non-combustible material or material of limited combustibility (composite products (National) listed in Table A7 must meet the test requirements given in paragraph A 12(b)). 7. Brickwork, blockwork, concrete and ceramic tiles. 8. Plasterboard (painted or not, with or without an air gap or fibrous or cellular insulating material behind). 9. Woodwool cement slabs. 10. Mineral fibre tiles or sheets with cement or resin binding.
Class C-s3, d2	4. Any material or product that achieves this class when tested in accordance with I.S. EN 13501-1 or any construction product with this class in Commission Decision as in 3 above		
Class D-s3, d2	5. Any material or product that achieves this class when tested in accordance with I.S. EN 13501-1 or any construction product with this class in Commission Decision as in 3 above	Class 3	11. Timber or plywood with density more than 400 kg/m ³ , (painted or unpainted). 12. Wood particle board or hard board, (either treated or painted). 13. Standard glass reinforced polyesters.

Notes (European):

For the purposes of the Building Regulations

1. Materials and products listed under Class A1 also meet Classes A2-s3, d2, B-s3, d2, C-s3, d2 and D-s3, d2.
2. Materials and products listed under Class A2-s3, d2 also meet Classes B-s3, d2, C-s3, d2 and D-s3, d2.
3. Materials and products listed under Class B-s3, d2 also meet Classes C-s3, d2 and D-s3, d2.
4. Materials and products listed under Class C-s3, d2 also meet Class D-s3, d2.
5. The National classifications do not automatically equate with the equivalent classifications in the European column, therefore products cannot typically assume a European class unless they have been tested accordingly.
6. When a classification includes "s3, d2", this means that there is no limit set for smoke production and/or flaming droplets/particles.

Notes (National):

1. Materials and products listed under Class 0 also meet Class 1.
2. The following materials and products may achieve the ratings listed below. However, as the properties of different products with the same generic description vary, the ratings of these materials/products should be substantiated by test evidence. Materials/products should also be assessed by reference to the toxic hazard they pose in combustion.

Class 0 - aluminium faced fibre insulating board, flame retardant decorative laminates on a calcium silicate board, thick polycarbonate sheet, phenolic sheet and uPVC;

Class 1 - phenolic or melamine laminates on a calcium silicate substrate and flame retardant decorative laminates on a combustible substrate.

Table A6 Use of materials of limited combustibility		
	Use	Material
1.	reinforcement/support for fire-stopping referred to in Section 3, 3.7.5	
2.	roof covering meeting the provisions: in Section 4, Diagram 19	
3.	class 0 materials meeting the provision in Appendix A paragraph A12(a)	
4.	ceiling tiles or panels of any fire-protecting suspended ceiling (Type D) in Table A2	
5.	Insulation above any fire-protecting suspended ceiling (Type D) in Table A2	(a) or (b) below (European) (c), (d), (e) or (f) below (National)
6.	Insulation material in external wall construction referred to in paragraph 4.4.4	

Materials of limited combustibility:

European class

(a) Any material classified as Class A1 in accordance with I.S. EN 13501-1: 2002, Fire classification of construction products and building elements, Part 1 - Classification using data from reaction to fire tests.

(b) Any material or product classified as Class A2-s3, d2 or better in accordance with I.S. EN 13501-1: 2002, Fire classification of construction products and building elements, Part 1 - Classification using data from reaction to fire tests

Notes: The National classifications do not automatically equate with the equivalent classifications in the European column, therefore products cannot typically assume a European class unless they have been tested accordingly. When a classification includes "s3, d2", this means that there is no limit set for smoke production and/or flaming droplets/particles.

National class

(c) Any non-combustible material listed in Table A7.

(d) Any material of density 300 kg/m³ or more which when tested to BS 476: Part 11, does not flame and the rise in temperature on the furnace thermocouple is not more than 20 degrees celsius.

(e) Any material with a non-combustible core at least 8 mm thick having combustible facings (on one or both sides) not more than 0.5 mm thick (when a flame spread rating is specified, these materials must also meet the appropriate test requirements).

(f) Any material of density less than 300 kg/m³, which when tested to BS 476: Part 11 does not flame for more than 10 seconds and the rise in temperature on the centre (specimen) thermocouple is not more than 35 degrees celsius and on the furnace thermocouple is not more than 25 degrees celsius.

Table A7 Use of non-combustible materials		
Use		Material
1.	roof coverings meeting the provision in Section 3, Diagram 10(a).	
2.	pipes meeting the provisions in Section 3, Table 3.4	
3.	flue walls meeting the provisions in Section 3, Diagram 13	
4.	external surfaces of walls where there is provision in Section 4, 4.4.3 for them to be constructed of non-combustible materials.	
5.	hinges meeting the provisions in Appendix B, paragraph B3	
6.	compartment walls and floors required by 3.5.4 of Section 3 to be constructed of non-combustible materials.	

Non-combustible materials:

European class

- (a) Any material classified as Class A1 in accordance with I.S. EN 13501-1: 2002, Fire classification of construction products and building elements, Part 1 - Classification using data from reaction to fire tests.
- (b) Products made from one or more of the materials considered as Class A1 without the need for testing, as defined in Commission Decision 2003/424/EC of 6th June 2003 amending Commission Decision 96/603/EC of 4th October 1996 establishing the list of products belonging to Class A1 (No contribution to fire) provided for in the Decision 94/61 1/EC implementing Article 20 of the Council Directive 89/106/EEC on construction products. None of the materials shall contain more than 1% by weight or volume (whichever is the lower) of homogeneously distributed organic material.

Note: The National classifications do not automatically equate with the equivalent classifications in the European column, therefore products cannot typically assume a European class unless they have been tested accordingly.

National class

- (a) Any material which when tested to BS 476: Part II: 1982 does not flame and there is no rise in temperature on either the centre (specimen) or furnace thermocouples.
- (b) Totally inorganic materials such as concrete, fired clay, ceramics, metals, plaster and masonry containing not more than 1 per cent by weight or volume of organic material (use in buildings of combustible metals such as magnesium/aluminium alloys should be assessed in each individual case).
- (c) Concrete bricks or blocks meeting) I.S. EN 771-3:2011
- (d) Products classified as non-combustible under BS 476: Part 4: 1970.

ANNEX

Materials to be considered as reaction to fire classes AI and A1 FL as provided for in Decision 2000/1 47/EC without the need for testing

General notes

Products should be made only of one or more of the following materials if they are to be considered as Class AI and Class A 1FL without testing. Products made by gluing one or more of the following materials together will be considered Class AI and Class A1FL without testing provided that the glue does not exceed 0.1% by weight or volume (whichever is the more onerous).

Panel products (e.g. of insulating material) with one or more organic layers, or products containing organic material which is not homogeneously distributed (with the exception of glue) are excluded from the list.

Products made by coating one of the following materials with an inorganic layer (e.g. coated metal products) may also be considered as Class AI and Class A1FL without testing.

None of the materials in the table is allowed to contain more than 1.0% by weight or volume (whichever is the more onerous) of homogeneously distributed organic material.

Material	Notes
Expanded clay.	
Expanded perlite	
Expanded vermiculite	
Mineral wool	
Cellular glass	
Concrete	Includes ready-mixed concrete and precast reinforced and pre stressed products
Aggregate concrete (dense and lightweight mineral aggregates, excluding integral thermal insulation)	May contain admixtures and additions (e.g. PFA), pigments and other materials. Includes precast units.
Autoclaved aerated concrete units	Units manufactured from hydraulic binders such as cement and/or lime, combined with fine materials (siliceous material, PEA, blast furnace slag), and cell generating material. Includes precast units.
Fibre cement	
Cement	
Lime	
Blast furnace slag/pulverised fly ash (PEA)	
Mineral aggregates	
Iron, steel and stainless steel.	Not in finely divided form.
Copper and copper alloys	Not in finely divided form.
Zinc and zinc alloys	Not in finely divided form.
Aluminium and aluminium alloys	Not in finely divided form.
Lead	Not in finely divided form.

Gypsum and gypsum based plasters	May include additives (retarders, fillers, fibres, pigments, hydrated lime, air and water retaining agents and plasticisers), dense aggregates (e.g. natural or crushed sand) or lightweight aggregates (e.g. perlite or vermiculite)
Mortar with inorganic binding agents	Rendering/plastering mortars and mortars for floor screeds based on one or more inorganic binding agent(s), e.g. cement, lime, masonry cement and gypsum.
Clay units	Units from clay or other argillaceous materials, with or without sand, fuel or other additives. Includes bricks, tiles paving and fireclay units (e.g. chimney liners).
Calcium silicate units	Units made from a mixture of lime and natural siliceous materials (sand, siliceous gravel or rock or mixtures thereof). May include colouring pigments
Natural stone and slate products	A worked or non-worked element produced from natural stone (magmatic, sedimentary or metamorphic rocks) or slate.
Gypsum unit	Includes blocks and other units of calcium sulphate and water, that may incorporate fibres, fillers, aggregates and other additives, and may be coloured by pigments.
Terrazo	Includes precast concrete terrazzo tiles and in-situ flooring.
Glass	Includes heat strengthened, chemically toughened, laminated and wired glass.
Glass ceramics	Glass ceramics consisting of a crystalline and a residual glass phase.
Ceramics	Includes dust-pressed and extruded products, glazed or unglazed.

Appendix B

Fire Doors

General

B1 A fire door is a door or shutter, provided for the passage of persons, air or objects, which together with its frame and furniture as installed in a building is intended when closed to resist the passage of fire and/or gaseous products of combustion, and is capable of meeting specified performance criteria to those ends (see definition of a fire door in S0 General Guidance).

Any reference to a fire door in this Technical Guidance Document, or in any code of practice or other document referred to in this Technical Guidance Document, is intended to mean a complete door assembly which includes the door leaf or leaves, the door frame, ironmongery (hinges, latches, closers, etc.) and any seals where required between the frame and leaf or between leaves in the case of a twin-leaf door, and which is installed in a building and is capable of meeting the required performance.

The performance of a fire door critically depends on the correct installation of the complete door assembly, strictly in accordance with the terms of the relevant test certification supplied by the door manufacturer.

Attention is drawn to the importance of the junction between the structure and the doorframe and the need to provide firestopping to maintain required fire resistance.

All fire doors should have the appropriate performance given in Table B1 either :

- (a) as determined with reference to Commission Decision 2000/367/EC of 3rd May 2000 (as amended) as regards the classification of the resistance to fire performance of construction products, construction works and parts thereof. All fire doors should be classified in accordance with IS EN 13501-2:2007 +A1 2009,

Fire classification of construction products and building elements, Part 2 - Classification using data from fire resistance tests (excluding products for use in ventilation systems). They are tested to the relevant European method from the following:

I.S. EN 1634 - 1: 2014, Fire resistance tests for door and shutter assemblies, Part 1 - Fire doors and shutters;

I.S. EN 1634 - 2:2008, Fire resistance tests for door and shutter assemblies, Part 2 - Fire door hardware;

I.S. EN 1634 - 3: 2004, Fire resistance tests for door and shutter assemblies, Part 3 - Smoke control doors and shutters.

Note:

For door sets manufactured after 1/09/2016, EN 16034 may apply. The co-existence period will end on 1/09/2019.

The performance requirement is in terms of integrity (E) for a period of minutes. An additional classification of Sa is used for all doors where restricted smoke leakage at ambient temperatures is needed.

or

- (b) by their performance under test to BS 476:Part 22, in terms of integrity for a period of minutes, e.g FD30. A suffix (S) is added for doors where restricted smoke leakage at ambient temperatures is needed.

The method of test exposure in either case is from each side of the door separately, except in the case of lift doors which are tested from the landing side only.

BS 8214: 2008 Code of Practice for fire door recommendations relating to the specification, design, manufacture, installation and maintenance of timber fire doors.

assemblies with non-metallic leaves, makes Further guidance is available in Code of Practice: "Hardware for Fire and Escape Doors" published by the Door and Hardware Federation (2012) www.dhfonline.org.uk

Guidance on timber fire-resisting doorsets, in Relation to the new European test method may be found in "Timber fire-resisting doorsets: maintaining performance under the new European test standard" (2002) published by TRADA. Technology and at www.trada.co.uk/techinfo/library

Guidance for metal doors is given in "Code of Practice for Fire Resisting metal doorsets" (2010) published by Door and Hardware Federation and at www.dhfonline.org.uk

Self-closing Devices

B2 All fire doors should be fitted with an automatic self-closing device which is capable of closing the door from any angle and against any latch fitted to the door.

In Community Dwelling Houses (P.G.1(d)) where persons with disabilities may be residing, and a self-closing device would be considered a hindrance to the normal use of the dwelling house, a free swing self-closing device to IS EN 1155 operated by the FDAS would be acceptable.

Note: Fire doors to cupboards in dwelling houses are not required to be fitted with self-closing devices. Fire doors to service ducts may be kept locked shut in lieu of being fitted with a self-closing device.

Fire Door Hardware

B3 Any hinge on which a fire door is hung should be made entirely from non-combustible materials having a melting point of at least 800° C. Hardware used on fire doors can significantly affect the performance of the door in a fire. Single access hinges where used should be manufactured in accordance with IS EN 1935.

Table B1 Provision of Fire Doors		
Position of door	Minimum fire resistance in terms of integrity (minutes)	
	European	National
1. Any door - (a) within a cavity barrier, (b) between a dwelling house and a garage	E20 E30Sa	FD 20 FD 30S
2 Any door - forming part of the enclosures to a protected stairway or protected corridor in a dwelling house,	E20	FD 20

Notes:

- S Unless pressurisation techniques complying with I.S. EN 2101-6 are used, these doors should have a leakage rate not exceeding 3 m³/hour (head and jambs only) when tested at 25 Pa under BS 476: Section 31.1
- Sa Unless pressurisation techniques complying with I.S. EN 2101-6 are used, these doors should also meet the additional classification requirement of Sa when tested in accordance with I.S. EN 1634-3: 2004.

See Appendix A, Table A3, for limitation on use of uninsulated glazed elements.

Appendix C

Methods of Measurement

Methods of Measurement

C1 Some form of measurement is an integral part of many of the provisions in this Document. Diagrams C1 to C5 show how the various forms of measurement should be made, based on definitions in S0 General Guidance.

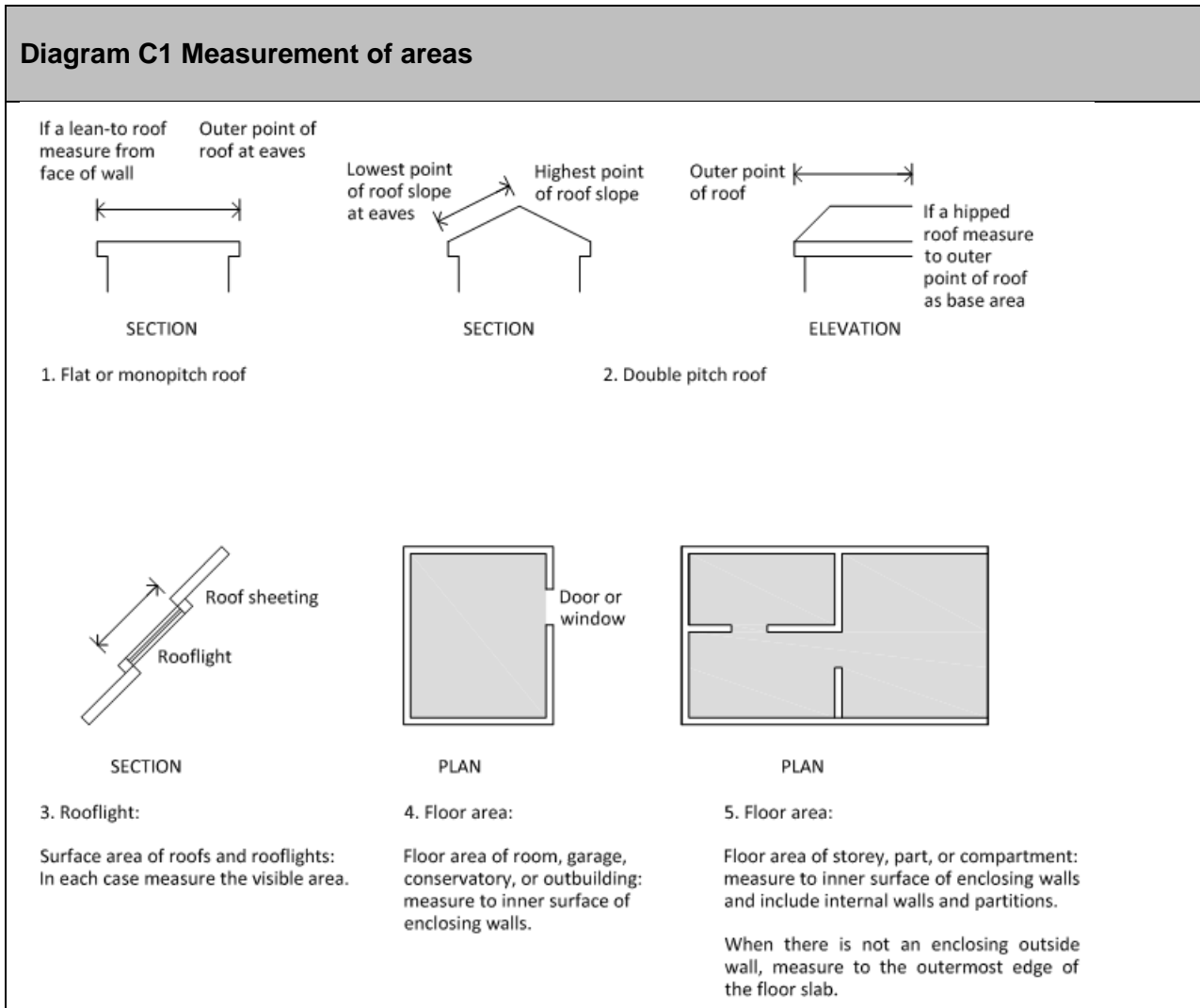
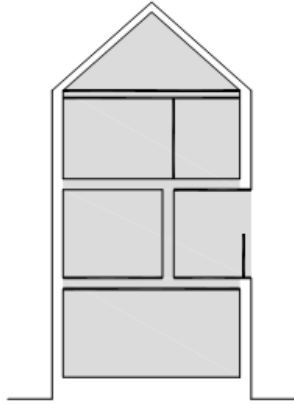


Diagram C2 Cubic capacity



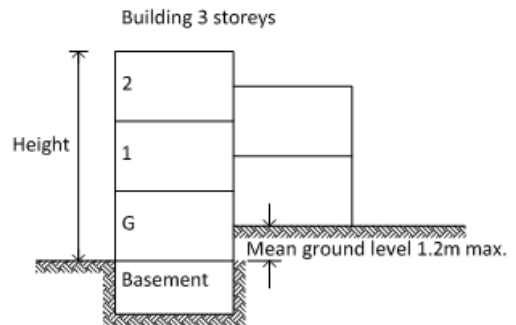
CUBIC CAPACITY OF BUILDING

Measure:

- to upper side of lowest floor;
- to lower side of roof;
- to inner surface of enclosing walls or, where there is not an enclosing outside wall, to the outermost edge of the floor.

Diagram C3 Number of storeys

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.



Note:

For definition of storey, see 0.1.17

Diagram C4 Height of top storey and depth of basement

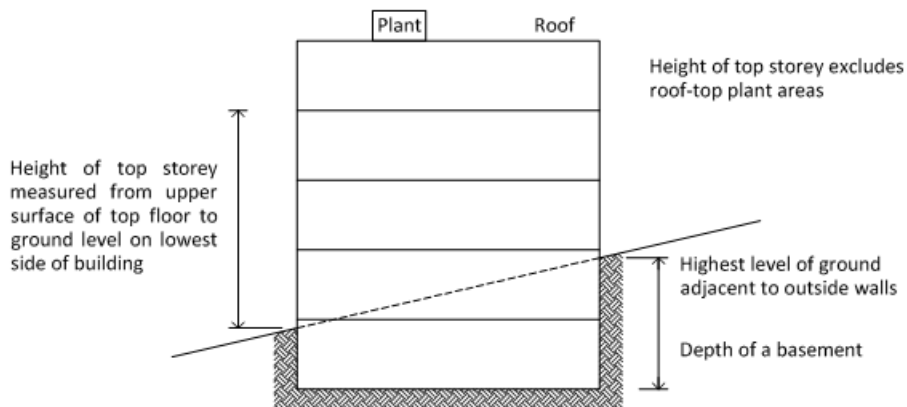
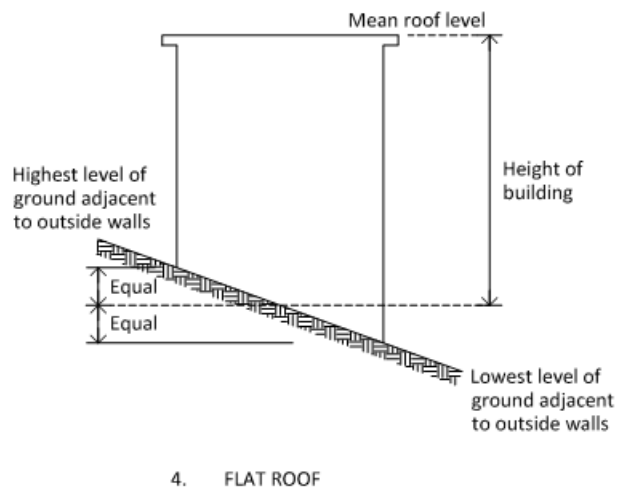
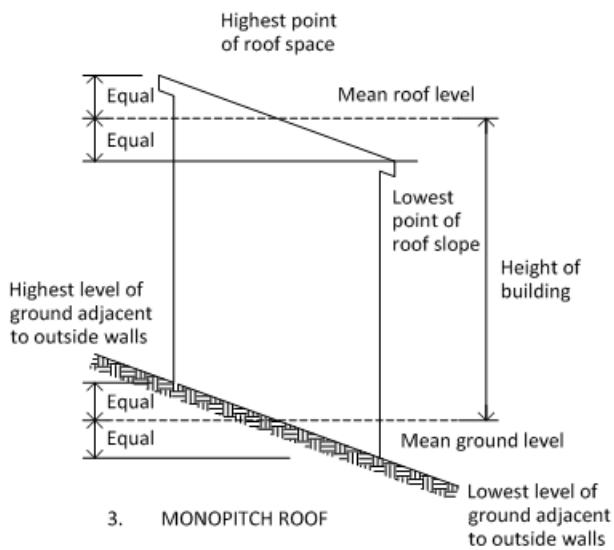
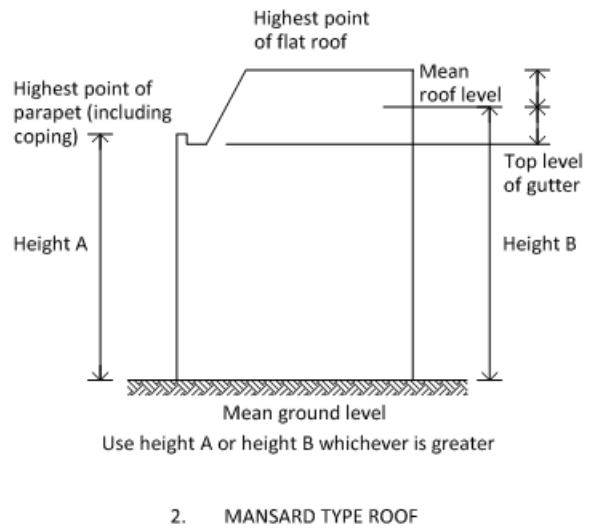
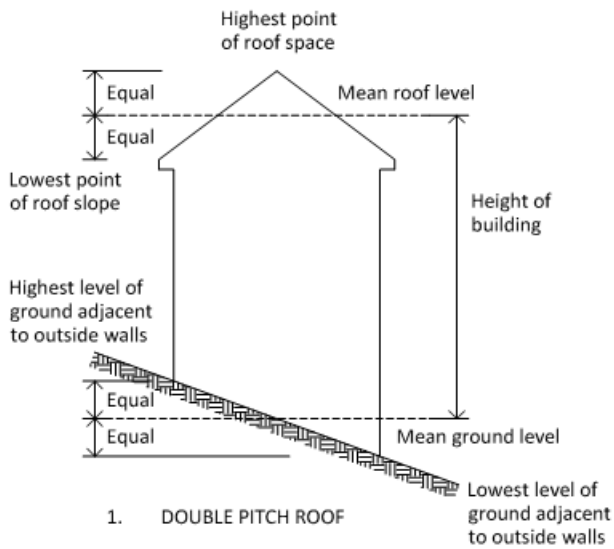


Diagram C5 Height of building



Appendix D

Loft Conversions

Loft Conversions

D.1 In the case of an existing single storey dwelling house to which a storey is to be added by converting the existing roof space into habitable accommodation, the converted dwelling house should comply with the provisions of 1.3.2.

In the case of an existing two storey dwelling house to which a storey is to be added by converting the existing roof space into habitable accommodation, the converted dwelling house should comply with the provisions of 1.3.3

D.2 The following provisions D2.1-D2.5 can only be applied as an alternative to those in 1.3.3 where the new second storey accommodation does not

- (a) exceed 50 m² in area; or
- (b) contain more than two habitable rooms.

Enclosure of existing stairway

D.2.1 The stairway in the ground and first storeys should be enclosed with walls and/or partitions which are fire-resisting, (see Appendix A) and the enclosure should either:

- (a) extend to a final exit (Diagram 2(a)); or
- (b) give access to at least two escape routes at ground level, each delivering to final exits and separated from each other by fire-resisting construction and self-closing fire doors (Diagram 2(b)).

New Stairway to additional storey

D.2.2 The new storey should be served by a Stairway meeting the provisions in Technical Guidance Document K - Stairways, Ladders, Ramps and Guards, 2014. The new stairway should be contained within an enclosure

which is formed by extending the existing enclosure in fire resisting construction so that the new accommodation is separated from the existing stairway. Two alternative approaches are given in (a) and (b) below:

- (a) The new stairway may rise over the existing stairway and within the same enclosure, in which case the stairway should be separated from the new room(s) by a self-closing fire door set in fire resisting construction;
- (b) The new stairway may alternatively rise from the existing room, in which case the new stairway should be separated from the existing room and the rest of the dwelling house by fire-resisting construction extending to the stairway enclosure with a self-closing fire door at the top or bottom of the new stairway.

Doorways

D.2.3 All doorways within the stairway enclosure to habitable rooms and cupboards should be fitted with a self-closing fire door where possible, or as a minimum with a self-closing fire door leaf or leaves in the existing frame. (See Appendix B)

Note: If the existing doors are considered to be of historical or architectural merit it may be possible to retain the doors or upgrade them to an acceptable standard.

Glazing

D 2.4 Any glazing in the enclosure to the existing stairway, including glazing in doors (whether or not they need to be fire doors), should be fire-resisting. There should be no openable glazed sections or other ventilation openings in the enclosure to the stairway.

This requirement does not apply to windows or external doors within the stairway enclosure.

Floors in Domestic Loft Conversions

D 2.5 The new storey should be separated from the rest of the dwelling house by fire-resisting construction.

In altering an existing two storey dwelling house it would be reasonable to provide a modified 30 minute standard of fire resistance to the existing and new floors.

Note: "Modified 30 minute" standard satisfies the test criteria for the full 30 minutes in respect of loadbearing capacity, but allows reduced performances for integrity and insulation (see Table A1, item 3(a)).

Fire resistance of timber floors in existing dwelling houses

D3 In an existing dwelling house floors may be required to be 30 minute fire resistance (as per Table A1)

The techniques generally adopted to upgrade the fire resistance of timber floors are as follows:

- (a) The addition of a fire-resisting layer, or layers, beneath the existing floor joists. There are many techniques and materials available for such purposes. In some cases it is also necessary to provide a protective layer on top of the existing floor-boards or between the floor joists.
- (b) Filling the voids between the existing floor surface and ceiling below, or between the floor joists, with a suitable material. There are a number of proprietary systems available which are based on this method. These are often more appropriate than the method outlined at (a) above in buildings of historic or architectural interest, where existing plasterwork is to be retained.

Many of the techniques employed in upgrading timber floors involve the use of proprietary materials and systems. These must be capable of achieving the required

performance in the situations for which they are adopted. Particular care and attention to detail in the execution of any such upgrading works is necessary to ensure the required performance.

Table 14 of Building Research Establishment Report "Guidelines for the construction of fire-resisting structural elements (BR 128 1988)" www.brebookshop.com provides guidance in relation to the construction of fire-resisting timber floors.

Guidance on fire-resisting timber floors is also available from the Timber Research and Development Association (TRADA) www.trada.co.uk and in the trade literature produced by manufacturers of fire protection materials and products.

Guidance on upgrading the fire resistance of existing timber floors is provided in Building Research Digest number 208 "Increasing the fire resistance of existing timber floors (revised 1988)".

Escape windows

D.4 The room (or rooms) in the new storey should each have an openable window or roof-light for escape or rescue purposes which meets the relevant provisions in 1.3.7.

Fire detection and alarm systems

D.5 Automatic smoke detection and alarms should be provided throughout the dwelling house in accordance with the provisions contained in Section 1.3.6. The above requirements may be met by the provision of radio interconnected smoke and heat alarms, each incorporating a ten year battery.

External Fire Spread

D.6 Particular attention should be given to the provisions in Section 4: External Fire Spread, which provide for space separation to existing buildings, namely 4.5.9 Material alteration of existing building and 4.5.10 Material change of use of existing building.

Referenced Standards and Publications

Standards referred to:

- I.S. 36-1:1986** Bitumen Roofing Felts - Part 1: Fibre and Glass Fibre Based Felts (Table A4 note)
- I.S. 3218: 2013** Fire Detection and Alarm Systems for Building: System Design Installation, Commissioning, Servicing and Maintenance.
- I.S. EN 771-3:2011** - Specification for Masonry Units – Part 3: Aggregate Concrete Masonry Units using an NSAI, System 2+ Certificate of factory production control.
- I.S. EN 1363-1:2012**- Fire resistance tests, Part 1 -General requirements
- I.S. EN 1363-2:2000** - Fire resistance tests, Part 2 -Alternative and additional procedures
- I.S. EN 1364-1:2015**- Fire resistance tests for non-loadbearing elements, Part 1 – Wall
- I.S. EN 1364-2:2000** - Fire resistance tests for non-loadbearing elements, Part 2 – Ceilings
- I.S. EN 1364-3:2014** - Fire resistance tests for non-loadbearing elements, Part 3 - Curtain walls - full configuration
- I.S. EN 1364-4:2014** - Fire resistance tests for loadbearing elements, Part 4 - Columns
- I.S. EN 1365-1: 2012** - Fire resistance tests for loadbearing elements, Part 1 - Walls
- I.S. EN 1365-2: 2014** - Fire resistance tests for loadbearing elements, Part 2 - Floors and roofs
- I.S. EN 1365-3: 2000** - Fire resistance tests for loadbearing elements, Part 3 - Beams
- I.S. EN 1365-4: 2000** - Fire resistance tests for loadbearing elements, Part 4 - Columns
- I.S. EN 1365-5: 2004** - Fire resistance tests for loadbearing elements, Part 5 - Balconies and walkways
- I.S. EN 1365-6: 2004** - Fire resistance tests for loadbearing elements, Part 6 - Stairs
- I.S. EN 1366-1: 2014** - Fire resistance tests for service installations, Part 1 - Ducts
- I.S. EN 1366-2: 2015** - Fire resistance tests for service installations, Part 2 - Fire dampers
- I.S. EN 1366-3: 2009** - Fire resistance tests for service installations, Part 3 - Penetration seals
- I.S. EN 1366-4: 2006+ A1 2010** - Fire resistance tests for service installations, Part 4 - Linear joint seals
- I.S. EN 1366-5: 2010** - Fire resistance tests for service installations, Part 5 - Service ducts and shafts

I.S. EN 1366-6: 2004 - Fire resistance tests for service installations, Part 6 - Raised access and - hollow core floors

I.S. EN 1366-7: 2004 - Fire resistance tests for service installations, Part 7 - Conveyor systems and their closures

I.S. EN 1366-8: 2004 - Fire resistance tests for service installations, Part 8 - Smoke extraction ducts

I.S. EN 1366-9: 2008 - Fire resistance tests for service installations, Part 9 - Single compartment smoke extraction ducts

I.S. EN 1366-10: 2011 - Fire resistance tests for service installations, Part 10 - Smoke control dampers

I.S. EN 1634-1: 2014 - Fire resistance tests for door and shutter assemblies, Part 1 - Fire doors and shutters

I.S. EN 1634-2: 2008- Fire resistance tests for door and shutter assemblies, Part 2 - Fire door hardware

I.S. EN 1634-3: 2004 - Fire resistance tests for door and shutter assemblies, Part 3 - Smoke control doors and shutters

I.S. EN 12101-6: 2005 - Smoke and heat control systems. Specifications for pressure differential systems, kits.

I.S. EN 13238: 2010 - Reaction to fire tests for building products-conditioning procedures and general rules for selection of substrates

I.S. EN 13501-1: 2007 - Fire classification of construction products and building elements, Part 1 - Classification using data from reaction to fire tests

I.S. EN 13501-2: 2016 - Fire classification of construction products and building elements, Part 2 Classification using data from fire resistance tests (excluding ventilation services)

I.S. EN 13501-3: 2005+A1 2009 - Fire classification of construction products and building elements, Part 3 - Classification using data from fire resistance tests on components of normal building service installations (other than smoke control systems)

I.S. EN 13501-4: 2007 +A1 2009 - Fire classification of construction products and building elements, Part 4 - "Classification using data from fire resistance tests on smoke control systems."

I.S. EN 13501-5:2006+A1 2009 Fire classification of construction products and building elements, Part 5 – Classification using test data from external fire exposure to roof tests

I.S. EN 13823: 2010+A1 2014 - Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item

I.S. EN ISO 1182:2010, Reaction to fire tests for building products - Non combustibility test

I.S. EN ISO 1716: 2010, Reaction to fire tests for building products - Determination of the gross calorific value

I.S. EN ISO 11925-2:2010 - Reaction to fire tests for building Products, Part 2 - Ignitability when subjected to direct impingement of a flame

I.S. ENV 1187: 2002 Test Methods for external fire exposure to roofs.

Eurocodes:

I.S. EN 1991-1-2:2002 Eurocode 1. Actions on structures. General actions. Actions on structures exposed to fire

I.S. EN 1992-1-2:2004 Eurocode 2. Design of concrete structures. General rules. Structural fire design

I.S. EN 1993-1-2:2005 Eurocode 3. Design of steel structures. General rules. Structural fire design

I.S. EN 1994-1-2:2005 Eurocode 4. Design of composite steel and concrete structures. General rules. Structural fire design

I.S. EN 1995-1-2:2004 Eurocode 5. Design of timber structures. General. Structural fire design

I.S. EN 1996-1-2:2005 Eurocode 6. Design of masonry structures. General rules. Structural fire design

I.S. EN 1999-1-2:2007 Eurocode 9. Design of aluminium structures. Structural fire design

BS 476 - Fire tests on building materials and structures

Part 3: 2004 - Classification and method of test for external fire exposure to roofs.

Part 4: 1970 (1984) - Non-combustibility test for materials

Part 6: 1989 + A1:2009 - Method of test for fire propagation for products

Part 7:1997-Method of test to determine the classification of the surface spread of flame of products

Part 11: 1982 (1988) - Method for assessing the heat emission from building products

Part 20: 1987 AMD 6487 - Method for determination of the fire resistance of elements of construction (general principles)

Part 21: 1987 - Methods for determination of the fire resistance of loadbearing elements of construction

Part 22: 1987 - Methods for determination of the fire resistance of non-loadbearing elements of construction

Section 31.1:1983 - Methods of measuring smoke penetration through doorsets and shutter assemblies. Measurement under ambient temperature conditions

Part 23: 1987 - Methods for determination of the contribution of components to the fire resistance of a structure

Part 24: 1987 - Method for determination of the fire resistance of ventilation ducts

BS 2782 -0: 2011 - Methods of testing plastics Introduction

BS 2782: Part 1 Thermal properties

Methods 120A to 120E: 1976 Determination of the Vicat softening temperature of thermoplastics

Method 508A: Performs so that the test flame extinguishes before the first mark, and the duration of flaming or afterglow does not exceed 5 seconds following removal of the burner

BS 5306: Part 2: 1990 Specification for sprinkler systems

BS 5499 5:2002 - Graphical symbols and signs, safety signs, including fire safety sign

Part 5: 2002: Signs with specific safety meanings

BS 6336: 1998 - Guide to development and presentation of fire tests and their use in hazard assessment

BS 7974: 2001 - Application of fire safety engineering principles to the design of buildings and associated Published Documents (PD's) Numbered 0-7

BS 8214: 2008 - Code of Practice for fire door assemblies with non-metallic leaves

BS 8217:2005- Reinforced bitumen membranes for roofing. Code of practice

B.S.9991: 2015 Fire Safety in the Design, Management and use of Residential Buildings

PD 6520: 1988 - Guide to fire test methods for building materials and elements of construction

ET101:2008: National Rules for Electrical Installations produced by the Electro-Technical Council of Ireland.

DD ENV 1363-3: 1999 - Fire resistance tests, Part 3 -Verification of furnace performance.

Publications referred to:

Architectural, Heritage Protection Guidelines for Planning Authorities Chapter 6 (page 89) and Chapter 17 published by the Heritage Section DEHLG 2005

“Code of Practice for Fire Resisting metal door sets 2010 “published by Door and Hardware Federation and at www.dhfonline.org.uk

Ensuring best practise for passive fire protection (PFP) systems in buildings. Association of Specialist Fire Protection (ASFP) (available from ASFP, Association House, 99 West Street, Farnham, Surrey, GU9 7EN, UK)

External fire spread: building separation and boundary distances. Building Research Establishment, (BR 187) 2014

Fire Grading of Buildings, Part 1. General Principles and Structural Precautions. Post-War Building Studies No. 20. HMSO, 1946

Fire protection in old buildings and historic town centres. The Fire Protection Association, London

Fire protection measures for the Royal Palaces (The Bailey Report). Department of National Heritage, London

Fire protection for structural steel in buildings (third edition P013) ISBN 1870409205 ASFPCM/SCI/FTSG 2002 (available from ASFP, Association House, 99 West Street, Farnham, Surrey, GU9 7EN, UK and the Steel Construction Institute, Silwood Park, Ascot, Berks, SL5 7QN, UK)

Guide for Practitioners 6:Conservation of Traditional Buildings, Historic Scotland, www.historic-scotland.gov.uk

Guidelines for the construction of fire-resisting structural elements. Building Research Establishment (BR 128)

Hardware for Fire and Escape Doors” Door and Hardware Federation (2009) www.dhfonline.org.uk

Heritage under fire. A guide to the protection of historic buildings. The United Kingdom Working Party on fire safety in historic buildings

Increasing the fire resistance of existing timber floors. Building Research Establishment (Digest 208)

National Rules for electrical installations (ET 101). The Electro Technical Council of Ireland

Fire Services Acts, 1981 and 2003

Licensing of Indoor Events Act, 2003

“Mounting and fixing in reaction to fire tests under the CPD”. IS CEN/TS 15447, 2006

New Approach Notified and Designated Organisations (NANDO) <http://ec.europa.eu/growth/tools-databases/nando/>

Recommendation for Site Development Works for housing areas

Safety, Health and Welfare at Work Act, 2005

Technical Guidance Document D – Materials and Workmanship

Technical Guidance Document J - Heat Producing Appliances

Technical Guidance Document K - Stairways, Ladders, Ramps and Guards

Technical Guidance Document M-Access and use

“Timber and fire-resisting doorsets: maintaining performance under the new European test standard” (2002) published by TRADA. Technology and at www.trada.co.uk/techinfo/library (available from TRADA Technology Ltd, Stocking Lane, Hughenden Valley, High Wycombe, Bucks, HP14 4ND, U.



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