

**STRUCTURAL FIRE  
PRECAUTIONS**





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Structural fire precautions

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### ASTERISKS

Throughout the Technical Standards an asterisk against a standard denotes that a provision deemed to satisfy the standard or some aspect of the standard is specified at the end of the relevant Part.

### ITALICS

Throughout the Technical Standards a term in italics is a defined term. The definition is listed in Part A, General.

+ As amended December 1999.

## Introduction

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- 1.** The intention of this Part is to ensure that the structure of a *building*, and the parts of a *building*, will remain stable in the event of fire, will restrict the spread of fire and smoke within the *building* and the spread of fire to other *buildings*.
- 2.** During a fire the *elements of structure* must continue to function, and remain capable of supporting and retaining any necessary protection of *escape routes* and fire access routes for an adequate period of time.
- 3.** To restrict the internal spread of fire, a *building* may have to be divided into *compartments* separated from each other by *compartment walls* or *compartment floors* intended to provide a complete barrier to fire between the *compartments*. In practice, the continuity of such walls and floors will have to be breached by openings for circulation or services and where this occurs special precautions are necessary to maintain the effectiveness of the barrier. The acceptable size of a *compartment* for this purpose is determined by its likely fire load which is, in turn, influenced by the *purpose group* of the *building*, or part of the *building*, in which it is situated and the provision, or otherwise, of active fire protection measures.
- 4.** To assist in the safe horizontal evacuation of residents in *hospitals*, residential care homes, and similar *buildings* there is a requirement for *buildings* in *purpose sub-group 2A* to be additionally divided into *sub-compartments*. By providing such a series of barriers it is intended that patients or residents will be able to remain longer in the *building* and avoid evacuation down stairs or to the outside.
- 5.** In order to limit the rapid spread of fire, standards are imposed on certain materials in terms of their reaction to fire.
- 6.** In order to reduce the danger to the occupants of other *buildings*, suitable separation must be provided between one *building* and another by either structure or distance. The acceptable distance between a *building* and its relevant *boundary* is dictated by the amount of heat that is likely to be radiated in the event of fire. This will be influenced by the extent of openings, or other unprotected areas, in the wall and the likely fire load of the *building*. Provision is also made to reduce the likelihood of fire spreading to roofs from an external source, and fire spreading up the elevations of a *building*.
- 7.** Standards are included which make specific provision for the fire safety of hospitals. However within the Technical Standards it is not possible to cover all aspects of fire safety relevant to hospitals. Fire safety is also dependent upon the way a building is furnished, staffed and managed. Designers of hospitals and other healthcare buildings will need to make reference to the full suite of documents that comprise “NHS in Scotland Firecode”.
- 8.** In order to permit the use of building materials tested either to British Standards or to European harmonised fire tests the “Deemed to Satisfy Provisions” provide alternative specifications which are equally acceptable.

## Regulation 12

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### STRUCTURAL FIRE PRECAUTIONS

**12. (1)** Every *building* shall be so *constructed* that, for a reasonable period, in the event of fire -

- (a) its stability is maintained;
- (b) the spread of fire and smoke within the *building* is inhibited; and
- (c) the spread of fire to and from other *buildings* is inhibited.

**(2)** This regulation shall not be subject to specification in a notice served under section 11 of *the Act*.

# The Standards

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## D1 Application of Part D

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**D1.1** This Part sets out the required standards for Regulation 12.

**D1.2** The Standards apply to all *buildings*, unless specified otherwise.

**D1.3\*** The level of fire safety performance of a *building* element or component is specified in terms of its -

- a. resistance to fire; and
- b. reaction to fire.

**Note:** Alternative “Deemed to Satisfy Provisions” are provided for D1.3 setting out methods of establishing levels of fire safety performance in terms of either fire tests specified in British Standards or European harmonised fire tests.

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## D2 Structural protection

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### PRINCIPLES

**D2.1\*** In order to enable the occupants of a *building* to reach a *place of safety* and to ensure that fire-fighters engaged in rescue or fire-fighting operations are not placed at undue risk, the *elements of structure* in a *building* must have a level of fire safety performance (see D1.3) which meets the requirements of Table 1 or Table 2 to this standard,

**except -**

- a. an *element of structure* in a single *storey building* which does not form part of, or support, a *separating wall*, *compartment wall*, or the enclosing structure of a *protected zone*;
- b. a floor consisting of removable panels situated directly above a floor which is an *element of structure*;
- c. a *gallery* floor;
- d. an openwork floor;
- e. a catwalk;
- f. the lowest floor of a *building*.

**Note:** Table 1 to D2.1 must be used for a single *storey building*, or the single *storey* part of a multi-*storey building* where the single *storey* part is a separate *compartment* or *compartments*.  
Table 2 to D2.1 must be used for all other *buildings*.

**D2.2** Where an *element of structure* provides support to another *element of structure*, a *compartment wall*, a *compartment floor*, a *separating wall*, a *separating floor*, the enclosing structure of a *protected zone*, a *flat roof*, an *access deck* or an *external wall*, to which a higher standard applies, the *element of structure* must meet that higher standard.

## D2.3

**NON-COMBUSTIBLE MATERIALS**

**D2.3** Where an *element of structure* provides support to a *separating floor* (see D5.6), a *separating wall* (see D5.7), an *external wall* (see D8.2), or an *escape stair* (including the floor of a *protected lobby*) (see D11.12) which is required to be of materials which are *non-combustible*, the *element of structure* must also be of materials which are *non-combustible* (see D1.3).

**Table 1 to D2.1: Minimum duration and maximum *compartment* area in a single storey building**

<i>Purpose groups and purpose sub-groups</i>	<i>Maximum area of a compartment (m<sup>2</sup>) [1]</i>	<i>Minimum duration of compartmentation, where required (see D3.1)</i>	<i>Minimum duration of external walls (see D8.1)</i>
1 <i>Dwellings</i>	Unlimited	Not required	Medium [2, 3]
2A Institutional	1,500	Medium	Medium [3]
2B Other residential	2,000	Medium	Medium [3]
3 Offices	4,000	Medium	Medium [3]
4 Shops and commercial	2,000 [4]	Long	Medium [5]
5A Assembly and recreational (high risk)	2,000	Medium	Medium [5]
5B Assembly and recreational (low risk)	6,000	Long	Medium [3]
6A Industrial (high risk)	33,000	Long	Medium [5]
6B Industrial (low risk)	93,000	Long	Medium [3]
7A Storage (high risk)	1,000	Long [6]	Medium [5]
7B Storage (low risk)	14,000	Long	Medium [5]
7C Open-sided car park	Unlimited	Not required	Not required

**Notes:**

1. In a *building* of *purpose groups* 3 and 5-7 areas can be doubled where there is an appropriate fire control system.
2. Short duration for -
  - a. a *dwelling* with an appropriate fire control system;
  - b. a detached *building* ancillary to a *dwelling* comprising a garden hut or store, or a *building* for keeping animals, birds or other livestock for domestic purposes;
  - c. a *conservatory* or *porch* attached to a *dwelling*;
  - d. a garage wall.
3. Short duration for a *building* more than 1 m from the *boundary*.
4. Unlimited provided there is an appropriate fire control system.
5. Short duration for a *building* more than 1 m from the *boundary* which has an appropriate fire control system.
6. A *building* comprising a single *compartment* of not more than 1000 m<sup>2</sup> is permitted. Where a *building* has a floor area more than this, it must be divided into a series of *compartments* so that no *compartment* is more than 200 m<sup>2</sup> if the *compartment walls* have a medium duration, or 500m<sup>2</sup> if the *compartment walls* have a long duration.

**Table 2 to D2.1: Minimum duration and maximum *compartment* area in a *building* other than a single *storey***

<i>Purpose groups and purpose sub-groups</i>	<i>Maximum area of a compartment (m<sup>2</sup>) [1]</i>	<i>Maximum area of an individual storey Within a compartment (m<sup>2</sup>) [1]</i>	<i>Duration of external walls (see D8.1)</i>	<i>Duration of elements of structure, and where appropriate compartmentation (see D3.1) in a basement</i>	<i>Duration of elements of structure, and where appropriate compartmentation (see D3.1)</i>		
					<i>The topmost storey of a building is at a height of not more than 7.5 m above ground</i>	<i>The topmost storey of a building is at a height of not more than 18 m above ground</i>	<i>The topmost storey of a building is at a height of more than 18m above ground</i>
1 <i>Dwellings</i>	Unlimited	Unlimited	Medium [2]	Medium	Short	Medium	Long
2A Institutional	1,500	1,500	Medium	Medium	Medium	Medium	Long [3]
2B Other residential	1,000	1,000	Medium [2]	Medium	Short	Medium	Long [3]
	2,000	2,000	Medium	Medium	Medium	Medium	Long [3]
	4,000	2,000	Medium	Medium	Long	Long	Long
3 Offices	2,000	2,000	Medium [2]	Medium	Short	Medium	Long [3]
	4,000	4,000	Medium	Medium	Medium	Medium	Long [3]
	8,000	4,000	Medium	Medium	Long	Long	Long
4 Shops and commercial	500 [4]	500 [4]	Medium [3]	Medium	Short	Medium	Long [3]
	1,000 [5]	1,000 [5]	Medium	Medium	Medium	Medium	Long [3]
	2,000 [6]	1,000 [6]	Medium	Medium	Long	Long	Long
5A Assembly & recreational (high risk)	1,000	1,000	Medium [2]	Medium	Short	Medium	Long [3]
	2,000	2,000	Medium	Medium	Medium	Medium	Long [3]
	4,000	2,000	Medium	Medium	Long	Long	Long
5B Assembly & recreational (low risk)	1,500	1,500	Medium [2]	Medium	Short	Medium	Long [3]
	3,000	3,000	Medium	Medium	Medium	Medium	Long [3]
	6,000	3,000	Medium	Medium	Long	Long	Long
6A Industrial (high risk)	500	500	Medium	Medium	Medium	Medium	Long [3]
	6,000	3,000	Medium	Medium	Long	Long	Long
6B Industrial (low risk)	2,000	2,000	Medium	Medium	Medium	Medium	Medium
	15,000	7,500	Medium	Medium	Long	Long	Long
7A Storage (high risk)	200	200	Medium	Medium	Medium	Medium	Long [3]
	1,000	500	Medium	Medium	Long	Long	Long
7B Storage (low risk)	500	500	Medium	Medium	Medium	Medium	Medium
	5,000	2,500	Medium	Medium	Long	Long	Long
7C Open-sided car park	Unlimited	Unlimited	Short	Medium	Short	Short	Short

**Notes:**

1. In a *building* of *purpose groups* 3 and 5-7, areas may be doubled where there is an appropriate fire control system.
2. Short duration for –
  - a. *external walls* more than 1 m of the *boundary*; and
  - b. *external walls* not more than 1 m from the *boundary* in the case of a *building* with an appropriate fire control system.
3. Medium duration for *compartmentation*.
4. 1,000 m<sup>2</sup>, provided there is an appropriate fire control system.
5. 2,000 m<sup>2</sup>, provided there is an appropriate fire control system.
6. Unlimited, provided there is an appropriate fire control system.

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## D3 *Compartmentation*

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### PRINCIPLES

- D3.1** In order to reduce the spread of fire and smoke, a *building*, or part of a *building*, with a total *storey* area more than the limits given in Tables 1 and 2 to D2.1 must be sub-divided by *compartment walls* and *compartment floors* with the level of fire safety performance in accordance with Tables 1 and 2 to D2.1.
- D3.2** Every *storey* at a height of more than 18 m above ground must form a separate *compartment*, or *compartments* where required by D3.1.

### BASEMENTS

- D3.3** Where a *building* has a *basement storey*, the floor of the *ground storey* must be a *compartment floor*, **except -**
- in a *building*, other than a *building of purpose sub-group 2A*, where the *building* comprises 1 *basement storey* and not more than 2 other *storeys*, and no *storey* has an area more than 280 m<sup>2</sup>.
- D3.4** Where a *building* has a *basement storey* at a depth of more than 10 m, every *basement storey* must form a separate *compartment*.

### BUILDINGS OF PURPOSE GROUP 2

- D3.5** In a *building of purpose group 2*, every upper *storey* and every *basement storey* must form a separate *compartment*, or *compartments* where required by D3.1.

### BUILDINGS OF PURPOSE GROUP 4

- D3.6\*** In a *building of purpose group 4*, each *compartment* with an area more than 5,600 m<sup>2</sup> must be provided with an appropriate smoke and heat exhaust ventilation system.
- D3.7\*** In an enclosed shopping centre with a mall on 2 or more *storeys* or having a total floor area more than 5,600 m<sup>2</sup>, the mall and every shop with a floor area more than 1,300 m<sup>2</sup> must be provided with an appropriate smoke and heat exhaust ventilation system.

### PLACES OF SPECIAL FIRE RISK

- D3.8\*** A *place of special fire risk* must be enclosed with the same level of fire safety performance as that required for a *compartment* with a medium duration, **except -**
- a suitably protected paint spray booth or *room* where a cellulose or other flammable liquid spray is used, having a floor area not more than 100 m<sup>2</sup>, and *constructed* of prefabricated factory made panels.
- D3.9** Where a *place of special fire risk* contains any appliance or equipment using hazardous liquid, any opening in a wall or floor separating it from the remainder of the *building* must be constructed in such a manner that, in the event of any liquid spillage, the *room* will contain all the liquid in the appliance or equipment, plus 10%.

**FIRE-FIGHTING SHAFTS**

**D3.10** A *fire-fighting shaft* must be enclosed with the same level of fire safety performance as that required for a *compartment* with a long duration,  
**except -**

where the *elements of structure* of the *building* are only required to have a medium duration the *fire-fighting shaft* need only have a medium duration.

**SMOKE VENTING SHAFTS**

**D3.11** A smoke venting shaft must be enclosed with the same level of fire safety performance as that required for a *compartment* with a medium duration,  
**except -**

at the smoke inlets and smoke outlets to the shaft.

**LIFTS**

**D3.12** Every lift well must be enclosed by *compartment walls* with a medium duration and, where the lift well is not the full height of the *building*, a *compartment floor* with a medium duration,  
**except -**

- a. a *compartment wall* is not required between a lift well and a *protected zone*; and
- b. the requirement for a lift well to be enclosed by *compartment walls* does not apply to -
  - i. a lift well in a *building of purpose sub-group 1C*, or
  - ii. a lift well within a *protected enclosure* of a *building of purpose sub-group 1B*.

**D3.13** Where a lift is installed, the landing controls and lift car controls must be of a type that do not operate because of conditions resulting from the effects of fire.

**OPENINGS**

**D3.14\*** A *compartment wall* and a *compartment floor* must have no openings and must provide a barrier to fire between the parts of a *building* to be divided, including any *roof space*,  
**except -**

- a. for a *chimney* or *flue-pipe* which is of suitable construction, so that in the event of fire the level of fire safety performance required of the *compartment wall* or *compartment floor* is maintained; or
- b. where there is an opening in the *compartment wall* with a suitable self-closing *fire door* with the same duration as the *compartment wall*,  
**except -**
  - a lockable door to a cupboard or service *duct* with a floor area not more than 3 m<sup>2</sup> need not be self-closing, or
- c. where there is an opening in the *compartment wall* with a shutter with the same duration as that required of the *compartment wall* actuated by a fusible link or other heat sensitive device with a controlled movement mechanism and audible warning when operated; or

**D3.14 – D4.2**

- d. where there is a *service opening* -
  - i. which is of suitable construction, or where the services are suitably protected, so that in the event of fire the level of fire safety performance required of the *compartment wall* or *compartment floor* is maintained, and
  - ii. which is suitably *fire-stopped*; or
- e. where there is an opening in the *compartment floor*, which contains a stair only, other than an *escape stair*, and/or not more than 2 escalators, and is provided either -
  - i. at *compartment floor* level with a suitably activated shutter in the plane of the floor which when closed maintains the level of fire safety performance of the *compartment floor*, or
  - ii. at each floor level, other than the top floor level, with a suitably activated shutter in the vertical plane which moves to enclose the opening and provide a barrier with the fire safety performance equivalent to a *compartment wall* with the same duration as the *compartment floor*.

**JUNCTIONS**

**D3.15** Where a *compartment wall* or *compartment floor* meets an *external wall*, a *separating wall* or a *compartment wall*, the junction must maintain the required level of fire safety performance of the *compartment wall* or *compartment floor*.

**D3.16\*** Where a *compartment wall* forms a junction with a roof, a suitable form of roof construction must be adopted.

**D3.17** In a *hospital* where a *compartment wall* meets an *external wall* there must be a 1 m wide strip of the *external wall* which has the same level of fire safety performance as the *compartment wall* to prevent lateral fire spread.

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## **D4 Sub-compartmentation**

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**BUILDINGS OF PURPOSE SUB-GROUP 2A**

**D4.1** In order to aid progressive horizontal evacuation and to limit fire spread in a *building of purpose sub-group 2A*, every *compartment* must be divided into *sub-compartments* by *sub-compartment walls* with a level of fire safety performance (see D1.3) with a short duration so that no *sub-compartment* is greater than 750 m<sup>2</sup>.

**D4.2** In a *building of purpose sub-group 2A* the following *rooms* must be enclosed with the same level of fire safety performance as that required for a *sub-compartment* -

- a. chemical stores;
- b. cleaners' *rooms*;
- c. clothes storage;
- d. dayrooms with a floor area greater than 20 m<sup>2</sup>;
- e. smoking *rooms*;
- f. disposal rooms;

- g.** laboratories;
- h.** lift motor rooms;
- i.** linen stores;
- j.** bedrooms in a *building* other than a *hospital*;
- k.** bedrooms in a *hospital* where they are used by -
  - i.** elderly people, or
  - ii.** those suffering with mental illness, or
  - iii.** people with learning difficulties;
- l.** *kitchens* (other than separate *hospital* departments);
- m.** laundry *rooms*;
- n.** staff changing and locker *rooms*;
- o.** store *rooms*;
- p.** X-ray film and record stores; and
- q.** all *rooms* within a main laundry in which delivery, sorting, processing packing and storing are carried out.

**D4.3** In a *building* of *purpose sub-group 2A* no *room* containing sleeping accommodation shall be intended for use by more than 4 people, **except -**

in a *hospital*.

### **HOSPITALS**

**D4.4** In a *hospital* every intensive therapy unit must be divided into at least 2 *sub-compartments* by *sub-compartment walls* with a level of fire safety performance (see D1.3) with a short duration.

**D4.5** In a *hospital* every entrance to an intensive therapy unit must be either -

- a.** from a *hospital street* (see E8.9); or
- b.** through a lobby, enclosed with the same level of fire safety performance as that required for a *sub-compartment*.

### **BUILDINGS OF PURPOSE SUB-GROUP 2B**

**D4.6** In order to aid evacuation and to limit fire spread, in a *building* of *purpose sub-group 2B*, each *room* containing sleeping accommodation (including any en-suite *sanitary accommodation* where provided) must be enclosed with the same level of fire safety performance as that required for a *sub-compartment*, **except -**

- a.** for a wall between such *rooms*. and
- b.** in the case of a place of lawful detention.

## D4.7 – 5.1

### OPENINGS

**D4.7\*** A *sub-compartment wall* must have no openings and must provide a barrier to fire between the parts of a *building* to be divided, including any *roof space*,  
**except -**

- a. for a *chimney* or *flue-pipe* which is of suitable construction, so that in the event of fire the level of fire safety performance required of the *sub-compartment wall* is maintained; or
- b. where there is an opening with a suitable self-closing *fire door* with the same duration as the *sub-compartment wall*,  
**except -**

a lockable door to a cupboard or service *duct* with a floor area not more than 3 m<sup>2</sup> need not be self-closing, or

- c. where there is a *service opening* -
  - i. which is of suitable *construction*, or where the services are suitably protected, so that in the event of fire the level of fire safety performance required of the *sub-compartment wall* is maintained, and
  - ii. which is suitably *fire-stopped*.

### JUNCTIONS

**D4.8** In a *hospital* where a *sub-compartment wall* meets an *external wall* there must be a 1 m wide strip of the *external wall* which has the same level of fire safety performance as the *sub-compartment wall* to prevent lateral fire spread.

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## D5 Separating walls and separating floors

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### PRINCIPLES

**D5.1\*** In order to limit the spread of fire and smoke, a *separating wall* or *separating floor* with a level of fire safety performance (see D1.3) with a medium duration must be provided between adjoining *buildings* or parts of a *building* where -

- a. they are in *different occupation*,  
**except -**

between garages in a block of garages where each garage is not more than 40 m<sup>2</sup> and the block is considered to be a single *building* for the purposes of this Part; or

- b. one part of the *building* is in single occupation and the other is in communal occupation,  
**except -**
  - i. between a part in single occupation and an external access balcony or *access deck*,
  - ii. in the case of an enclosed shopping centre with a mall on not more than 2 *storeys*, between a shop and the mall (see D5.5); or

- c.** they are in the same occupation, but of different *purpose groups*,  
**except -**
  - i. where the affected parts of the *building* comply throughout with whatever is the most onerous of any required standard contained in this Part,
  - ii. short duration is sufficient where both the *purpose groups* concerned are of *purpose groups* or *sub-purpose group* 3, 4, 6b or 7b, and an appropriate fire control system is installed on both sides of the *separating wall*, or on the *storeys* above and below the *separating floor*; or
- d.** in the case of a *hospital* -
  - i. between different *hospital* departments, and
  - ii. between a *hospital* department and a *protected zone*, and
  - iii. between different *storeys*,  
**except -**  
short duration is sufficient in a single *storey hospital*.

### **BUILDINGS OF PURPOSE GROUP 1**

**D5.2** In the case of a *building* of *purpose group* 1, a *separating wall* or *separating floor* with a level of fire safety performance (see D1.3) with a short duration must be provided -

- a.** between solid waste storage accommodation and the rest of the *building*; and
- b.** between a *dwelling* and any integral or attached garage,  
**except -**

where the garage ceiling has a short duration, any *roof space* directly above the garage need not be separated from the *dwelling*, or any *roof space* above the *dwelling*, by a *separating wall*.

### **HOSPITALS**

**D5.3\*** In a *hospital* the following *hospital* departments must -

- a.** never be directly below, nor directly adjoin, the operating theatres, intensive therapy units or special care baby units; and
- b.** be provided with an appropriate fire control system where they are directly below, or directly adjoin, any other *hospital* department to which patients have access -
  - i. boiler house,
  - ii. central stores,
  - iii. commercial enterprises,
  - iv. flammable stores,
  - v. laundry,
  - vi. main electrical switchgear,
  - vii. main *kitchens*,

## D5.3 – 5.6

- viii. refuse collection and incineration,
- ix. works department.

**D5.4\*** In a *hospital* the following *hospital* departments must be provided with an appropriate fire control system where they are directly below, or directly adjoin operating theatres, intensive therapy units, or special care baby units -

- a. central staff change;
- b. central sterile supplies;
- c. *hospital* sterilising and disinfecting unit;
- d. health records;
- e. pathology;
- f. manufacturing pharmacy.

### ENCLOSED SHOPPING CENTRES WITH MALLS

**D5.5** An enclosed shopping centre with a mall must be designed so that -

- a. the mall width must at no part be less than 6 m; and
- b. where 2 or more shops having mall-level storey areas more than 2000 m<sup>2</sup> are located opposite each other, then at least 1 must be separated from the mall by a *separating wall*.

**Note:**

In this standard opposing shop frontages are those which make an angle of less than 80 degrees with each other.

### NON-COMBUSTIBLE MATERIALS

**D5.6** Every part of a *separating floor* must be of materials which are *non-combustible* (see D1.3), **except -**

- a. in a *building of purpose sub-group 1A* with no *storey* at a height of more than 18 m, other than over solid waste storage accommodation;
- b. between a shop or office and a *dwelling* above the shop or office in the same occupation and where -
  - i. there is no other *dwelling* above the shop or office,
  - ii. the *building* has no *storey* at a height of more than 18 m, and
  - iii. the area of the shop or office is not more than 1½ times the area of the *separating floor*;
- c. above a *pend* in a *building of purpose group 1*, where the ceiling of the *pend* is *constructed of non-combustible* materials (see D1.3) and the floor immediately above has a level of fire safety performance with medium duration;
- d. between *dwellings* and *shared residential accommodation*.

**D5.7** Every part of a *separating wall* must be of materials which are *non-combustible* (see D1.3), **except -**

a wall may contain a structural frame of material which is low, medium, high or very high risk, provided any insulants exposed to a cavity are low risk materials or *non-combustible*, the internal linings are low risk materials or *non-combustible*, and the wall contains no pipes, wires or other services, and is between -

- a. *houses*; or
- b. a *dwelling* and any integral or attached garage; or
- c. garages; or
- d. *flats* or *maisonettes*, with no *storey* at a height of more than 18 m, where the wall does not form part of the enclosure of solid waste storage accommodation; or
- e. in a *building* with no *storey* at a height of more than 18 m, between *flats* or *maisonettes* and an *escape stair* enclosure; or
- f. between *dwelling*s and *shared residential accommodation*.

## OPENINGS

**D5.8\*** A *separating wall* and a *separating floor* must have no openings and must provide a barrier to fire between the parts of a *building* to be separated, including any *roof space*, **except -**

- a. for a *chimney* or *flue-pipe* which is of suitable *construction* so that in the event of fire the level of fire safety performance required of the *separating wall* or *separating floor* is maintained; or
- b. where the *separating wall* is required by D5.1b and it is an opening with a suitable self-closing *fire door* with the same duration as the *separating wall*, **except -**  

a *fire door* in a *separating wall* between a *flat* or *maisonette* and a *protected lobby* or *protected zone* may be short duration; or
- c. where the *separating wall* is required by -
  - i. D5.1c, D5.1d or D5.2b, and
  - ii. it is an opening with a suitable self-closing *fire door* with the same duration as the *separating wall*; or
- d. where there is a *service opening* -
  - i. which is of suitable *construction*, or where the services are suitably protected, so that in the event of fire the level of fire safety performance required of the *separating wall* or *separating floor* is maintained, and
  - ii. which is suitably *fire-stopped*.

## JUNCTIONS

**D5.9** Where a *separating wall* or *separating floor* meets an *external wall* or a *separating wall*, the junction must maintain the required level of fire safety performance of the *separating wall* or *separating floor*.

## D5.10 – D6.2

**D5.10\*** Where a *separating wall* forms a junction with a roof -

- a. low, medium, high and very high risk material (see D1.3) must not be built into, or carried through or across the ends of, or over the top of, the wall in such a way as to impair resistance to spread of fire between the relevant parts of the *building*; and
- b. a suitable form of roof *construction* must be adopted.

**D5.11** In a *hospital* where a *separating wall* meets an *external wall* there must be a 1 m wide strip of the *external wall* which has the same level of fire safety performance as the *separating wall* to prevent lateral fire spread.

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## D6 Concealed spaces

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### PRINCIPLES

**D6.1** In order to prevent the unseen spread of fire and smoke, every *cavity* and *roof space* within a *building* must be divided by *cavity barriers* with a level of fire safety performance (see D1.3) with a short duration installed -

- a. around the edges of the *cavity*; and
- b. between the *cavity* and any other *cavity*,  
**except -**  
  
at a junction between 2 walls each comprising two leaves of masonry or concrete at least 75 mm thick; and
- c. between a *roof space* and any other *roof space*.

**D6.2** Every *cavity* must be divided up by *cavity barriers* with a level of fire safety performance (see D1.3) with a short duration so that the maximum distance between *cavity barriers* is not more than 20 metres where the *cavity* has surfaces which are *non-combustible* or low risk materials, or 10 m where the *cavity* has surfaces which are medium, high or very high risk materials,  
**except -**

- a. a *cavity* between a roof and a ceiling (see D6.3); or
- b. a *cavity* formed by 2 leaves of masonry or concrete at least 75 mm thick; or
- c. a *cavity* between a floor and a ceiling with a suitable fire safety performance (see D1.3) with a short duration; or
- d. a *cavity* below an imperforate floor next to the ground and the *cavity* is either inaccessible or is not more than 1 m high; or
- e. a *cavity* formed by overcladding, where both surfaces of the overcladding are low risk materials or *non-combustible* (see D1.3) attached to a masonry or concrete *external wall* or a concrete roof, and where the *cavity* contains only *non-combustible* material; or
- f. a *cavity* between a floor which is an *element of structure*, and a raised floor consisting of removable panels; or
- g. a *cavity* above an operating theatre and its ancillary rooms within a *hospital*.

**D6.3** A *cavity barrier* with a level of fire safety performance (see D1.3) with a short duration must be installed between a roof and a ceiling in a *building of purpose groups 2-7* above an undivided space, as set out in the table to this standard,  
**except -**

- a. where the ceiling has a suitable level of fire safety performance with a short duration (see D1.3); or
- b. a *cavity* above an operating theatre and its ancillary rooms within a *hospital*.

**Table to D6.3: Maximum distance between *cavity barriers* (m)**

Above an undivided space :	Where surfaces are <i>non-combustible</i> or low risk materials	Where surfaces are medium, high or very high risk materials
Intended for sleeping	20	15
Not intended for sleeping	20 [1]	20

**Note:**

1. No limit in *purpose sub-group 2B* and *purpose groups 3-7*.

**D6.4** Where a *cavity* is above a ceiling in a *building of purpose sub-group 2B* and continues over a wall between bedrooms or between a bedroom and any other part of the *building*, a *cavity barrier* with a level of fire safety performance (see D1.3) with a short duration must be installed in the same plane as the wall,  
**except -**

where the ceiling has a level of fire safety performance (see D1.3) with a short duration.

#### **RAINSCREEN CLADDING**

**D6.5** In a *building* with a *storey* at a height of more than 18 m above the ground with ventilated rainscreen panels *cavity barriers* with a level of fire safety performance (see D1.3) with a short duration must be installed within the ventilated void horizontally at every floor level and vertically on the line of every *compartment wall*, *sub-compartment wall* or *separating wall* abutting the *external wall*.

#### **CEILINGS INSTEAD OF *CAVITY BARRIERS***

**D6.6** Where a ceiling is provided, instead of a *cavity barrier* as required by D6.2, D6.3 or D6.4, it must be -

- a. not easily demountable; and
- b. *non-combustible* (see D1.3), or where there is any thermal insulation which is supported by the ceiling, that insulation must be *non-combustible*.

#### **OPENINGS**

**D6.7\*** A *cavity barrier*, and a ceiling provided instead of a *cavity barrier*, must be imperforate,  
**except -**

- a. a *cavity barrier* may contain a suitable self-closing *fire door*;
- b. a ceiling may contain a hatch which, when closed, will maintain the level of fire safety performance of the ceiling;

## D6.7 – 7.1

- c. for a *service opening* -
  - i. which is of suitable *construction*, or where the services are suitably protected, so that in the event of fire, the level of fire safety performance required is maintained, and
  - ii. where it is suitably *fire-stopped*.

### JUNCTIONS

**D6.8** Where a wall, floor or other part of a *building* which is required to have a level of fire safety performance, abuts a structure containing a *cavity*, a *cavity barrier* with a level of fire safety performance (see D1.3) with a short duration must be installed so as to extend the line of the structure with the level of fire safety performance,  
**except -**

- a. a *cavity* formed by two leaves of masonry or concrete at least 75 mm thick; or
- b. a *cavity* formed by overcladding, both surfaces of which are *non-combustible* or low risk materials, attached to a masonry or concrete *external wall* or a concrete roof and the *cavity* contains only *non-combustible* materials; or
- c. in the case of a wall which is required to have a level of fire safety performance only because it is loadbearing.

**D6.9\*** A *cavity barrier* must be tightly fitted to rigid *construction*, or where this is not possible (for example, in the case of a junction with slates, tiles, corrugated sheeting or similar materials) the junction must be suitably *fire-stopped*.

**D6.10** A *cavity barrier* must be fixed so that its performance is not affected by -

- a. movement of the *building* due to subsidence, shrinkage or thermal change;
- b. collapse in a fire of any services penetrating it;
- c. failure in a fire of its fixings;
- d. failure in a fire of any material or *element of structure* which it abuts,  
**except -**

where a *cavity barrier* is installed between a roof and a ceiling, there is no requirement to protect roof members supporting the *cavity barrier*.

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## D7 Fire spread on internal linings

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### PRINCIPLES

**D7.1\*** In order to resist the spread of fire and smoke, every *room*, *fire-fighting shaft*, *protected zone* or *unprotected zone*, must have wall and ceiling surfaces with a level of fire safety performance (see D1.3) which meet the requirements of the table to this standard,  
**except-**

- a. in a *room* any part of the wall may be of one risk category higher than that required (but not very high risk) where the total area of those parts in any 1 *room* is not more than either half the floor

area of the *room*; or in the case of a *building* of -

- i. *purpose group* 1 or 2, 20 m<sup>2</sup>, or
- ii. any other *purpose group*, 60 m<sup>2</sup>,

whichever is the lesser; and

- b. in a *building* solely housing livestock, the surfaces of *unprotected zones* may have any level of fire safety performance, other than very high risk; and
- c. thermoplastic materials in ceilings, rooflights and light fittings with diffusers (see D7.2); and
- d. external windows and internal *glazing* to *rooms* (but not *protected zones* or *unprotected zones*) may be fitted with suitable plastics *glazing* materials.

**Notes:**

1. A wall includes the surface of *glazing* and any ceiling or soffit at an angle to the horizontal of more than 70 degrees but excludes doors, skirtings and other facings.
2. A ceiling includes the underside of rooflights, but excludes ceiling hatches and facings.
3. Wall and ceiling surfaces means the substrate or lining material including any treatment thereof to restrict flame spread, but excludes any wallpaper or paints applied on site for decorative purposes only.

**Table to D7.1: Fire spread on wall and ceiling surfaces**

<i>Purpose group or purpose sub-group</i>	<b>Highest permitted level of risk</b>					
	<i>Room not more than 4 m<sup>2</sup></i>	<i>Room more than 4 m<sup>2</sup> and not more than 30 m<sup>2</sup></i>	<i>Room more than 30 m<sup>2</sup></i>	<i>Unprotected zone and protected enclosure</i>	<i>Protected zone and fire-fighting shaft [1]</i>	
1 <i>Dwellings</i>	Medium [2]	Medium	Medium	Medium	Low	
2A Institutional	High	Medium	Low [3]	Low	Low	
2B Other residential	High	Medium	Medium	Medium	Low	
3 Offices	High	High	Medium	Medium	Low	
4 Shops and commercial	High	High	Medium	Low [4]	Low	
5 Assembly & recreational	High	High	Medium	Medium	Low	
6 Industrial	High	High	Medium	Medium	Low	
7A Storage (high risk)	High	High	Low	Medium	Low	
7B & C Storage (low risk) and open-sided car parks	High	High	Medium	Medium	Low	

**Notes:**

1. Including any *sanitary accommodation* within the enclosures of a *protected zone*
2. A *room* other than a *kitchen* may be high risk.
3. A ceilings may be medium risk.
4. In an enclosed shopping centre with a mall, structural timbers supporting glazing that forms part of a shop front unit signs (except very high risk), and stallboard risers, are permitted provided they are not in total more than 20% of the area of the shop front.

**D7.2\*** Thermoplastic materials in ceilings, rooflights and light fittings with diffusers must be suitably designed and installed.

**SANDWICH PANELS**

**D7.3** A *sandwich panel* used for internal walls or linings in a *building* of purpose groups 1 or 2 must be fully filled with a core which consist of *non-combustible* material (see D1.3).

## D7.4 – D8.2

**D7.4\*** A *sandwich panel* used for internal walls or linings in a *building* of *purpose groups* 3 to 7 must be suitably designed and installed.

## D8 Fire spread to adjoining *buildings*

### PRINCIPLES

**D8.1\*** In order to minimise the risk of spread of fire between *buildings*, an *external wall* of a *building* must meet the requirements of Tables 1 and 2 to D2.1, **except -**

- a. for a level of unprotected area as indicated in the table to this standard; or
- b. in the case of a *building* ancillary to a *dwelling* and comprising a *carport*, *covered area*, *greenhouse*, summerhouse, or swimming pool enclosure.

**Table to D8.1: Permitted level of unprotected area**

<i>Purpose group or purpose sub-group</i>		permitted level of unprotected area		
		not more than 1 m from the <i>boundary</i>	more than 1 m from the <i>boundary</i>	
			no appropriate fire control system	appropriate fire control system
1	<i>Dwellings</i>	Level C	Level A	Unlimited
2	Institutional and other residential	Level C	Level A	Unlimited
3	Offices	Level C	Level A	Unlimited
4	Shops and commercial	Level C	Level B	Level A
5A	Assembly & recreational (high risk)	Level C	Level B	Level A
5B	Assembly & recreational (low risk)	Level C	Level A	Unlimited
6A	Industrial (high risk)	Level C	Level B	Level A
6B	Industrial (low risk)	Level C	Level A	Unlimited
7A, 7B	Storage	Level C	Level B	Level A
7C	Open-sided car parks	Level C	Unlimited	Unlimited

#### Note:

UNPROTECTED AREAS are:

- a. any part of an *external wall* which has a level of fire safety performance less than that required by the Tables to D2.1; and
- b. any opening, including a door or window, but not an unopenable window containing only *glazing* which reacts to heat to provide the required level of fire safety performance for an *external wall*; and
- c. any part of an *external wall* which has a material, more than 1 mm thick attached or applied to its external face, whether for cladding or any other purpose, which is low, medium, high or very high risk (see D1.3).

### NON-COMBUSTIBLE MATERIALS

**D8.2** Every part of an *external wall* not more than 1 m from a *boundary* must be of *non-combustible* materials (see D1.3), **except -**

- a. a wall in a *building* of *purpose group* 1, or in *shared residential accommodation*, with no *storey* at a height of more than 18 m above ground containing a structural frame of a material other than one which is *non-combustible* and with an external cladding of a material which is *non-combustible*;

- b. any thermal insulation in a wall in a *building* with no *storey* at a height of more than 18 m above ground.

**Note:** See also D10.1.

## TWO OR MORE *BUILDINGS* ON LAND IN THE SAME OCCUPATION

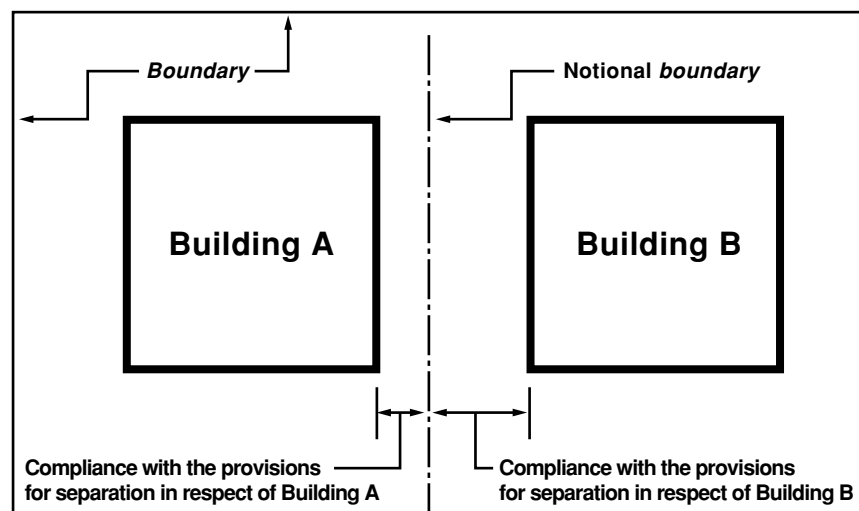
**D8.3** Where the combined areas of any *storey* of each of 2 or more *buildings* is more than that allowed by D3.1, and the *buildings* are to be on land in the same occupation, or in the case of a single *building* having opposing *compartments* externally, then -

- a. the *buildings* must be separated by a distance not less than the sum of the distances calculated in respect of each *building* relative to a notional *boundary* between them in accordance with this standard, as if the notional *boundary* were a *boundary* (see diagram to D8.3); and
- b. the roofs of the *buildings* must be separated by a distance not less than the sum of the distances provided in relation to the notional *boundary* in accordance with the requirements of D9 in respect of each roof.

**Note:**

Where a notional *boundary* described above is to be established between 2 *buildings*, one of which is an existing *building*, for the purposes of this standard the existing *building* must be regarded as if it were a new *building*.

**Diagram to D8.3: Notional boundaries**



## D9 Fire spread from an adjoining *building*

**D9.1\*** In order to resist penetration or ignition by fire from an external source and limit the spread of flame on its external surface, the roof of a *building*, including any rooflights, but excluding any wallhead fascia, soffit or barge board, must meet the requirements of the table to this standard, **except -**

the roof of a detached garage, *greenhouse*, garden hut or store, summerhouse or *building* for keeping animals, birds or other livestock for domestic purposes ancillary to a *dwelling*, that are located at least 1 m from the *dwelling* and 1 m from the *boundary*.

## D9.1 – D10.2

**Table to D9.1: Acceptable roof coverings**

Maximum distance to the boundary	Highest permitted vulnerability of roof covering	
	Building of purpose sub-group 2A	All other buildings
not more than 6m	low	low
more than 6 m	low	medium [1]
more than 12 m	low	medium [2]
more than 24 m	high	high

**Notes:**

1. High vulnerability is permitted in a detached *house*, in a part of the roof not more than 3 m<sup>2</sup> in area and at least 1.5 m from any similar part, the remainder of the roof being of a medium vulnerability.
2. High vulnerability is acceptable in a detached *house*.

**Note:**

A roof covering or rooflight which is exposed within the *building* will be subject also to the requirements of D7.2.

**D10** Fire spread on an *external wall*

**D10.1\*** In order to limit the fire spread on an *external wall*, any cladding to the *external wall* must either -

- a. be of materials with a level of fire safety performance (see D1.3) to meet the requirements of the table to this standard; or
- b. meet the requirements of a suitable test for the fire safety performance of external cladding systems.

**Note:** See also D8.2.

**Table to D10.1: Required level of fire safety performance of the cladding to an *external wall***

A building at a height of	Purpose group or sub-purpose group	Location	Highest permitted level of risk
Not more than 18 m above the ground	5	Not more than 10 m above the ground (or above a roof or any part of the building to which the public have access)	Low
	5	More than 10 m above the ground	Very high
	2A	Any	Low
	All others	Any	Very high
More than 18 m above the ground	Any	Any	Low

**D10.2** In a *building* with a *storey* at a height of more than 18 m above the ground, insulation material situated or exposed within a *cavity* in the *external wall construction* must be *non-combustible* (see D1.3), **except -**

for a *cavity* which is between 2 leaves of masonry or concrete at least 75 mm thick, and which has a *cavity barrier* around all openings in the wall and at the top of the wall.

**BUILDINGS OF SUB-PURPOSE GROUP 2A**

**D10.3** In a *building of sub-purpose group 2A* where a lower roof abuts an *external wall* the roof must provide a level of fire safety performance (see D1.3) with a medium duration for a distance of at least 3 m from the wall.

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## **D11**    *Escape route protection*

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**PROTECTED ZONES**

**D11.1\*** The enclosing structure of a *protected zone*, not being a roof or an *external wall* but including the floor other than that of the lowest *storey*, must have a level of fire safety performance (see D1.3) with a medium duration, unless a more onerous standard is required (see D2 and D3), and any door in the enclosing structure of a *protected zone* must be a suitable self-closing *fire door*,  
**except-**

in the case of a *protected zone* in *shared residential accommodation*, short duration.

**PROTECTED LOBBIES**

**D11.2\*** Where a *protected lobby* is required within a *protected zone*, the wall dividing the *protected lobby* from the rest of the *protected zone* must have a level of fire safety performance (see D1.3) with a short duration and any door in the wall must be a suitable self-closing *fire door*.

**PROTECTED ENCLOSURE**

**D11.3\*** Where a *protected enclosure* is required within a *dwelling*, the walls must have a level of fire safety performance (see D1.3) with a short duration, and any door in the wall must be a suitable self-closing *fire door*,  
**except -**

where a wall between *sanitary accommodation* and an adjacent *room* has a level of fire safety performance with a short duration, a wall or door between the *sanitary accommodation* and the *protected enclosure* need not have a level of fire safety performance.

**CORRIDOR DIVISIONS**

**D11.4\*** Where a wall is required to divide a corridor for smoke control (see E5.23) it must have a level of fire safety performance (see D1.3) with a short duration and any door in the wall must be a suitable self-closing *fire door*.

**Note:**

A *cavity barrier* may also be required see D6.7.

**ENCLOSING ROOMS IN ESCAPE STAIRS**

**D11.5\*** Every wall or screen separating a reception *room*, an office, a cleaner's *room*, or a store from an *escape stair* (see E6.8c) must have a level of fire safety performance (see D1.3) with a short duration and every door in the wall or screen structure must be a suitable self-closing *fire door*,  
**except -**

a lockable door to a cleaner's *room* or a store with a floor area not more than 3 m<sup>2</sup> need not be self-closing.

## D11.6 – D11.12

### GALLERIES

**D11.6** Where it is permitted to enclose below a *gallery* (see E5.24), the floor of the *gallery* must have a level of fire safety performance (see D1.3) with a short duration.

### EXTERNAL WALLS

**D11.7** Every part of an *external wall*, including a door, below an *external escape stair*, or not more than 2 m from the stair, must have a level of fire safety performance (see D1.3) with a short duration.

**D11.8** Every door from a *building* to an *external escape stair*, including a landing, access *gallery* or *access deck* served by the *escape stair*, past which door there is an *escape route* must have a level of fire safety performance (see D1.3) with a short duration,  
**except -**

the door at the top of the *external escape stair*.

**D11.9** In a *building* of *purpose sub-group* 1A, every part of an *external wall*, including a door, past which there is an *escape route*, including a landing, access *gallery* or *access deck* served by an *escape stair*, must have a level of fire safety performance (see D1.3) with a short duration up to a height of at least 1.1 m measured from the level of the *escape route*.

**D11.10** Where any part of an *external wall* of an *escape stair* enclosure is not more than 2 m from, and makes an angle of not more than 135 degrees with, any part of an *external wall* of another part of the *building*, it must have a level of fire safety performance (see D1.3) with a medium duration.

### ESCAPE OVER FLAT ROOFS

**D11.11** Where a flat roof or *access deck* forms part of an *escape route* -

- a. it must have a level of fire safety performance (see D1.3) with medium duration for the width of the *escape route* and for a further 3 m on either side of the *escape route*; and
- b. every wall not more than 2 m from either side of the *escape route* must comply with D11.9.

### NON-COMBUSTIBLE MATERIALS

**D11.12** Every part of an *escape stair* including the floor of a *protected lobby* must be *non-combustible* (see D1.3),  
**except -**

- a. in *shared residential accommodation*; or
- b. any handrail on an *escape stair*; or
- c. an *escape stair* which complies with E6.6a or E6.6b; or
- d. a floor finish, wall or ceiling lining, or an external cladding, which does not contribute to the level of fire safety performance required for the part it covers.

**AUDITORIA**

**D11.13\*** In a *building* containing an auditorium having an *occupancy capacity* of more than 500, any separated stage and stage area must be separated from the remainder of the *building* by a wall with the same level of fire safety performance as a *compartment wall* with a medium duration, **except -**

at the proscenium opening, provided there is a suitable safety curtain.

**D11.14\*** In a *building* containing an auditorium, the ventilation system must be suitably designed to ensure that the direction of air movement in the event of fire is from the auditorium towards the stage.

**D11.15\*** In a *building* containing an auditorium having an *occupancy capacity* of more than 500, any separated stage and stage area must have a suitable high level outlet over the stage of sufficient area to allow the escape of smoke and hot gases in the event of fire on the stage.

**Note:**

A separated stage means a stage which is separated from the auditorium except at the proscenium opening. For this purpose the stage area includes any scenery dock, workshop, under-stage area and staff or orchestra *room*, and any other part ancillary to the stage.



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## Provisions deemed to satisfy the standards

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### LEVEL OF FIRE SAFETY PERFORMANCE

#### RESISTANCE TO FIRE

**(D1.3)** The requirements of D1.3a in terms of resistance to fire are satisfied by the alternative “Deemed to Satisfy Provisions” which set out methods of establishing levels of fire safety performance in terms of either fire tests specified in British Standards or European harmonised fire tests. There are also additional notes on single *storey* steel portal frame *buildings*, suspended ceilings, and steel framed opended carparks after the section on Harmonised European Standards.

#### a. British Standards and Associated Specifications

The duration required will be satisfied where the *construction* is capable of meeting the time criteria set out in the Columns 3, 4 and 5 of Table 1 to (D1.3). The tests and specifications being in either -

- i. Clause 10 of BS 476: Part 20: 1987, when read in conjunction with -  
for loadbearing elements - BS 476: Part 21: 1987,  
for non-loadbearing elements - BS 476: Part 22: 1987,  
for components - BS 476: Part 23: 1987,  
for ventilation *ducts* - BS 476: Part 24: 1987,  
for *fire door* assemblies with non-metallic leaves - BS 8214: 1990: Sections 1 and 2, or
- ii. in the case of structural steelwork, BS 5950: Part 8: 1990; or
- iii. in the case of structural use of timber, BS 5268: Part 4: Sections 4.1 and 4.2: 1990, or
- iv. in the case of structural use of concrete, BS 8110: Part 2: 1985: Section 4.3 “Tabulated data (method 1)”; or
- v. an appropriate specification given in the Building Research Establishment Report BR 128 “Guidelines for the Construction of Fire Resisting Structural Elements” (BRE 1988);

#### b. Harmonised European Standards

The duration required will be satisfied where the *construction* is capable of meeting the time criteria set out in the Column 6 of Table 1 to (D1.3) and specified in Commission Decision 2000/367/EC of 3/5/2000 implementing Council Directive 89/106/EEC as regards the classification of the resistance to fire safety performance of *construction* products, *construction* works and parts thereof. The tests being specified as follows -

prEN 13501-2: 1999, Fire classification of *construction* products and building elements-Part 2: Classification using data from fire resistance tests (excluding products for use in ventilation systems).

BS EN 1363-1: 1999, Fire resistance tests, Part 1-General requirements

BS EN 1363-2: 1999, Fire resistance tests, Part 2-Alternative and additional procedures

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

BS EN 1364-1: 1999, Fire resistance tests for non-loadbearing elements-Part 1: Walls

BS EN 1364-2: 1999, Fire resistance tests for non-loadbearing elements-Part 2: Ceilings

**(D1.3)****Table 1 to (D1.3): Minimum periods of resistance to fire**

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
<i>Construction</i>	<i>Duration</i>	<i>British Standards</i>			<i>European Standards</i>	<i>Test exposure</i>
		<i>Loadbearing capacity (mins)</i>	<i>Integrity (mins)</i>	<i>Insulation (mins)</i>		
1. Structural frame, column or beam	Short	30	None	None	R 30	Faces exposed on the inside
	Medium	60	None	None	R 60	
	Long	120	None	None	R 120	
2. <i>Compartment floor, separating floor, floor of a gallery (where enclosure below is permitted), floor of a protected zone, and flat roof or access deck used as an escape route</i>	Short	30	30	30	REI 30	From the underside
	Medium	60	60	60	REI 60	
	Long	120	120	120	REI 120	
3. Floor, other than a floor in 2.	Short	30	None	None	R 30	From the underside
	Medium	60	None	None	R 60	
	Long	120	None	None	R 120	
4. Shutter in a <i>compartment floor</i> (see D3.14)	Short	None	30	None	E 30	From the underside when fitted in frame
	Medium	None	60	None	E 60	
	Long	None	120	None	E 120	
5. <i>Compartment wall, sub-compartment wall, separating wall, or a wall or screen required for escape route protection</i>	Short	30 [4]	30	30 [5]	REI 30 [4,5]	Each side separately
	Medium	60 [4]	60	60	REI 60 [4]	
	Long	120 [4]	120	120	REI 120 [4]	
6. Loadbearing wall, other than a wall in 5	Short	30	None	None	R 30	Each side separately
	Medium	60	None	None	R 60	
	Long	120	None	None	R 120	
7. <i>Fire door</i> in a wall in 5	Short	None	30 [6]	None	E 30 Sa [6]	Each side separately, when fitted in frame [7]
	Medium	None	60 [6]	None	E 60 Sa [6]	
	Long	None	120 [6]	None	E 120 Sa [6]	
8. Shutter in a <i>compartment wall</i> (see D3.14), or in a wall or screen required for <i>escape route</i> protection.	Short	None	30	30 [8]	EI 30 [8]	Each side separately, when fitted in frame [7]
	Medium	None	60	60 [8]	EI 60 [8]	
	Long	None	120	120 [8]	EI 120 [8]	
9. <i>External wall</i> [1] more than 1 m from a boundary [2]	Short	30 [4]	30	None	RE 30 [4]	From the inside only
	Medium	60 [4]	60	30	RE 60 & I 30 [4]	
10. <i>External wall</i> [1] not more than 1 m from a boundary [2]	Short	30 [4]	30	30	REI 30 [4]	Each side separately
	Medium	60 [4]	60	60	REI 60 [4]	
11. <i>Horizontal cavity barrier</i> [3]	Short	None	30	None	E 30	From the underside
12. <i>Vertical cavity barrier</i> [3]	Short	None	30	None	E 30	Each side separately
13. Ceiling dispensing with a <i>cavity barrier</i> (D6.2,6.3,6.4)	Short	None	30	30	EI 30	From the underside
14. Roof against an <i>external wall</i> (see D10.3)	Medium	None	60	60	EI 60	From the inside

**Notes:**

1. Except for an unprotected area, unless required fire resistance is needed for *escape route* protection.
2. Any shutter or door in an *external wall*, which is not included in the calculation of unprotected area, should have the same period of fire resistance and the same test exposure as the *external wall*.
3. In a timber stud wall or partition the following will also be deemed to have a short duration -
  - a. polythene sleeved mineral wool, or mineral wool slab, in either case under compression when installed; or
  - b. calcium silicate, cement based or gypsum based board at least 12 mm thick; or
  - c. steel at least 0.5 mm thick; or
  - d. timber at least 38 mm thick.
4. None in the case of column 4, and no loadbearing (R) in the case of column 6, if it is not a loadbearing construction.
5. None in the case of column 5, and E 30 in the case of column 6, for a single window not more than 1 m<sup>2</sup> in a room required to be enclosed by D4.2 or D11.5.
6. Unless pressurisation techniques complying with BS 5588: Part 4: 1998 are used, the *fire door* should also either -
  - a. in the case of column 4, have a leakage rate not exceeding 3m<sup>3</sup>/m/hour, head and jambs only, when tested at 25Pa according to Section 31.1 of BS 476: 1983 with AMD 8366/ November 1994, or
  - b. in the case of column 6, meet the additional classification requirement of Sa when tested to BS EN 1634-3 2001, except, where the *fire door* is in an *external wall*.
7. Other than a lift door which is tested from the outside only, and other than a *fire door* in an *external wall* which is tested from the inside only.
8. None in the case of column 5, and no insulation (I) requirement in the case of column 6, where -
  - a. the width of the shutter or the aggregate width of any shutters in the wall or part of the wall is not more than one-quarter of the length of the relevant part of the wall; or
  - b. people or vehicle circulation routes are clearly marked and will prevent any fire load adjacent to the shutter (e.g. position of stairs, escalators, lifts and corridors).

**(D1.3)**

BS EN 1365-1: 1999, Fire resistance tests for loadbearing elements-Part 1: Walls  
 BS EN 1365-2: 1999, Fire resistance tests for loadbearing elements-Part 2: Floors and roofs  
 BS EN 1365-3: 1999, Fire resistance tests for loadbearing elements-Part 3: Beams  
 BS EN 1365-4: 1999, Fire resistance tests for loadbearing elements-Part 4: Columns

BSEN 1366-1: 1999, Fire resistance tests for service installations-Part 1: Ducts  
 BSEN 1366-2: 1999, Fire resistance tests for service installations-Part 2: Fire dampers

BS EN 1634-1: 2000, Fire resistance tests for door and shutter assemblies-Part 1: Fire doors and shutters  
 BS EN 1634-3: 2001, Fire resistance tests for door and shutter assemblies-Part 3: Smoke control doors

**c. Single storey steel portal frame buildings**

In the case of a single storey steel portal frame building the requirements of D2.1 for protection to the elements of structure may be met by a steel portal frame having fixed column base connections or designed in accordance with the guide 'The Behaviour of Steel Portal Frames in Boundary Conditions' second edition published in 1990 by The Steel Construction Institute (SCI), instead of the level of fire safety performance set out in Table 1 to (D1.3).

Where level of fire safety performance is required for a steel portal frame member because it supports a compartment wall or a separating wall or an external wall related to its distance from a boundary (D2.2) such a level of fire safety performance shall apply only to that part of the member built into or directly supporting the wall up to the underside of the haunch or the underside of the rafter where there is no haunch, and shall not apply to any other part notwithstanding that it is part of the same portal frame.

In the case of a gable steel portal frame member which is required to have a level of fire safety performance because of the distance of the gable wall from a boundary (D2.2), the entire portal frame shall have the level of fire safety performance.

**d. Suspended ceilings**

The level of fire safety performance of a floor may include that of an associated suspended ceiling with a level of fire safety performance where the ceiling -

- i. complies with Table 2 to (D1.3) with no openings other than those permitted in the standard concerned, and
- ii. any access hatch, door or panel to the cavity formed by the ceiling maintains the level of fire safety performance of the ceiling when closed.

The level of fire safety performance of the floor shall be the level of fire safety performance of the floor/ceiling assembly.

**Table 2 to (D1.3): Suspended ceilings**

Where the desired level of fire safety performance of the floor/ceiling assembly is - (m)	Height of topmost storey of building	Then the construction and level of fire safety performance of the ceiling should be -
Short or Medium	Not more than 7.5	Ceiling of low risk material or <i>non-combustible</i>
	More than 7.5	Ceiling of low risk material or <i>non-combustible</i> ; and Ceiling imperforate; and Supports and fixings for the ceiling <i>non-combustible</i> .
Long	Any	Ceiling <i>non-combustible</i> ; and Ceiling imperforate; and Supports and fixings for the ceiling of <i>non-combustible</i> ; and No access hatch, door or panel is permitted.

**e.** steel framed open-sided car parks (*purpose sub-group 7c*)

In the case of steel framed open sided car parks (*purpose sub-group 7c*), where the topmost storey of the building is at a height of not more than 18m above ground, the requirements of D2.1 for the structural frame, columns and beams may be met by -

- i. beams supporting concrete floors, each beam having a maximum  $H_p/A = 230^{-1}m$ , and
- ii. free standing columns, each having a maximum  $H_p/A = 180^{-1}m$ , and
- iii. wind bracing and struts, each having a maximum  $H_p/A = 210^{-1}m$ .

Where  $H_p$  = heated perimeter of the section in m  
and  $A$  = gross cross-sectional area of the section in  $m^2$ .

## **REACTION TO FIRE**

**(D1.3)** The requirements of D1.3b. in terms of reaction to fire are satisfied by the alternative “Deemed to Satisfy Provisions” which are provided setting out methods of establishing levels of fire safety performance in terms of either fire tests specified in British Standards or European harmonised fire tests for the reaction to fire of *elements of structure, separating walls, separating floors, cavity barriers, linings, external walls, ceilings, external claddings and escape stairs*. In addition, some materials are deemed intrinsically to be *non-combustible* and therefore do not require testing.

**a.** British Standards

Column 2 of Table 3 to (D1.3) sets out the reaction to fire standards to BS 476 which are deemed to satisfy.

**b.** Harmonised European Standards

Column 3 of Table 3 to (D1.3) sets out the reaction to fire test standards which are deemed to satisfy in accordance with Commission Decision 2000/147/EC of 8/2/2000 implementing Council Directive 89/106/EEC as regards the classification of the reaction to fire safety performance of construction products defines the classes of the essential requirement “Safety in case of fire”. prEN 13501-1 2000 provides the reaction to fire classification procedure for all construction products within the scope of the Construction Products Directive.

**Table 3 to (D1.3): Reaction to Fire**

Column 1	Column 2	Column 3
Risk	British Standards	European Standards
<i>Non-combustible</i>	<p>The material is certified <i>non-combustible</i> according to the test specified in BS 476: Part 4: 1970 (1984) throughout; or</p> <p>The material does not flame or cause any rise in temperature on either the centre (specimen) or furnace thermocouples according to the test specified in BS 476 Part 11: 1982 (1988).</p>	<p>The material has achieved a classification of A1 when tested in accordance with BS EN ISO 1182 and BS EN ISO 1716; or</p> <p>The material has achieved a classification of A2 when tested in accordance with BS EN 13823 and BS EN ISO 1182 or BS EN ISO 1716; or</p> <p>Products made from only 1 or more of the materials considered as Class A1 without the need for testing, as defined in Commission Decision 96/603/EC of 4/10/1996 (amended 26/9/2000) establishing the list of products belonging to Class A1 “No contribution to fire” provided for in the Decision 94/611/EC implementing Article 20 of the Council Directive 89/106/EEC on the construction products. None of the materials contain more than 1.0% by weight or volume (whichever is the lower) of homogeneously distributed organic material.</p>
Low risk	<p>The surface material (or where it is bonded throughout to a substrate, the surface material combined with the substrate) has a surface of Class 1 and, when tested in accordance with BS 476: Part 6: 1981 or BS 476: Part 6: 1989 has an index of performance (I) not more than 12 and a sub-index (i<sub>1</sub>) not more than 6.</p>	<p>The material has achieved a classification of B or better when tested in accordance with BS EN 13823 and BS EN ISO 11925-2</p>
Medium risk	<p>The material of the wall or ceiling complies with the tests for surface spread of flame in relation to Class 1 in BS 476: Part 7: 1987 (1993).</p>	<p>The material has achieved a classification of C or better when tested in accordance with BS EN 13823 and BS EN ISO 11925-2</p>
High risk	<p>The material of the wall or ceiling complies with the tests for surface spread of flame in relation to Class 2 or Class 3 in BS 476: Part 7: 1987 (1993).</p>	<p>The material has achieved a classification of D or better when tested in accordance with BS EN 13823 and BS EN ISO 11925-2</p>
Very high risk	<p>A material which does not meet the criteria for high risk</p>	

## FIRE CONTROL SYSTEM

### (D2.1)(D5.1)(D5.3)(D5.4)(D8.1)

The requirements of D2.1, D5.1, D5.3, D5.4 and D8.1 for an appropriate fire control system will be met by adopting, in the case of -

- a. a sprinkler system, BS5306: Part 2: 1990;
- b. a carbon dioxide system, BS 5306: Part 4: 1986;
- c. a low expansion foam system, BS 5306: Part 6: Section 6.1: 1988;
- d. a medium and high expansion foam system, BS 5306: Part 6: Section 6.2: 1989;
- e. a powder system, BS 5306: Part 7: 1988.

#### **Note:**

Selection of system is discussed in BS 5306: Part 0: 1986.

In an enclosed shopping centre, the fire control system should cover the entire shopping centre, **except -**

- i. a mall or part of a mall with a ceiling height more than 10 m,
- ii. a stairway enclosure,
- iii. a car park, and
- iv. every area where sprinklers would prove a hazard (e.g. main electrical switchgear).

In an enclosed shopping centre the level of fire control protection should be appropriate to the occupancies within the shopping centre and should be determined on the basis of risk assessment, with Quick Response Sprinklers (with a response time index of less than  $50\text{m}^{1/2}\text{s}^{1/2}$ ); and comply with the Loss Prevention Council Rules for Automatic Sprinkler Installations (LPC, 1994) (including all additional life safety recommendations).

## SMOKE AND HEAT EXHAUST VENTILATION SYSTEMS

**(D3.6)** The requirement of D3.6 and D3.7 for an appropriate Smoke and Heat Exhaust Ventilation

**(D3.7)** System will be one which -

- a. is designed in accordance with the principles set out in -
  - i. the Building Research Establishment Report, BR 368, "Design methodologies for smoke and heat exhaust ventilation, (1999), and
  - ii. the CIBSE Technical Memorandum 19 (1995); and
- b. is designed as follows -
  - i. by dividing the underside of the roof into smoke reservoirs each of which should be not more than  $2000\text{ m}^2$  in area and at least 1.5 m deep measured to the underside of the roof or any high level plant or *ducts* within the smoke reservoir or the underside of an imperforate suspended ceiling,

**(D3.6, 3.7)**

- ii. by separating the smoke reservoirs by fixed or automatically descending smoke curtains which are no greater than 60 m apart, measured at right angles to the curtains, and comply with BS 7346: Part 1:1990,
- iii. smoke should not be allowed to descend to a height of less than 3 m above any floor level,
- iv. each smoke reservoir should be provided with the necessary number of smoke *ventilators* or extract fans to extract the calculated volume of smoke produced, spaced evenly throughout the reservoir,
- v. where mechanical extraction is used, there should be spare fan capacity equivalent to the largest single fan in the reservoir which will operate automatically on the failure of any one of the fans, or which runs concurrently with the fans,
- vi. any fans, *ducts* and reservoir screens provided should be designed to operate at the calculated maximum temperature of the smoke within the reservoir in which they are located but rated to a minimum of 300° C for 30 minutes, in accordance with BS 7346: 1990,
- vii. structures supporting any fans, *ducts* or reservoir screens should have the same level of fire safety performance as the element it supports,
- viii. the fans or *ventilators* within a smoke reservoir should operate on the actuation of the fire control system or smoke detection system within the reservoir or on the operation of the fire control system or more than one smoke detector or, following a delay not exceeding 4 minutes, one smoke detector, in any adjoining area not being another smoke reservoir,
- ix. replacement air should be provided automatically on the operation of the ventilation or exhaust system at a level at least 0.5 m below the calculated level of the base of the smoke layer,
- x. any power source provided to any elements of the smoke and heat ventilation system should be connected by mineral insulated cables or by cables which meet the requirements of code A category specified in BS 6387: 1994 or by cables protected from damage to an equal standard,
- xi. an automatically switched standby power supply provided by a generator should be connected to any fans provided as part of the smoke and heat ventilation system capable of simultaneously operating the fans in the reservoir affected and the two adjacent reservoirs,
- xii. simple manual overriding controls for all smoke exhaust, ventilation and air input systems should be provided at all fire brigade access points and any fire control room provided,
- xiii. where outlets are provided with weather protection they should open on the activation of the fan(s) or *ventilators*,
- xiv. smoke from areas adjoining the smoke reservoirs should only be able to enter one reservoir,
- xv. where there is an openwork ceiling the free area of the ceiling should not be less than 25% of the area of the smoke reservoir, or, for natural ventilation, 1.4 times the free area of the roof mounted fire *ventilator* above (3 times where the height from floor to roof *ventilator* is more than 12 m), whichever free area is the greater, and be evenly distributed to prevent an unbalanced air flow into the reservoir, and
- xvi. when a natural ventilation system is used and the smoke reservoir includes a suspended ceiling, other than an openwork ceiling, the free area of the *ventilator* opening in the suspended ceiling, or any *ventilator* grille in the ceiling, should not be less than 1.4 times (3 times where the height from floor to roof *ventilator* is more than 12 m) that of the roof mounted fire *ventilator* above in the case of a *ventilator* opening, or 2 times (3.5 times where the height from floor to roof *ventilator* is more than 12 m) for any *ventilator* grille.

**(D3.8), (D3.14, D4.7, D5.8, D6.7, D11.1, D11.2, D11.3, D11.4, D11.5)****PAINT SPRAY BOOTHS**

**(D3.8)** The requirements of D3.8 for a suitably protected paint spray booth or *room* where a cellulose or other flammable liquid spray is used, will be met where it is formed in accordance with the Health and Safety Executive Guidance Note PM25 “Vehicle finishing units fire and explosion hazards”.

**ACTIVATION OF SHUTTERS SEALING COMPARTMENT FLOORS**

**(D3.14)** The requirements of D3.14e.i. for suitable activation of a shutter in the plane of the floor will be met by a fusible link or other heat-sensitive device positioned to detect fire in the lower *compartment* which, when activated -

- a. will cause any escalator within the opening to come to a halt and then cause the shutter to close or;
- b. where there is no escalator, cause the shutter to close immediately.

There should also be appropriate audible and visual warning devices which operate on detection.

The requirements of D3.14e.ii. for suitable activation of a shutter in the vertical plane will be met by a smoke detection in every floor served by the escalator or staircase which, when activated, will cause -

- a. any escalator within the opening to come to a halt and then cause the shutter to close on the floor where detection has occurred or;
- b. where there is no escalator, cause the shutter to close immediately on the floor where detection has occurred.

There should also be appropriate signage on the side of the shutter facing the stairway or escalator to indicate the appropriate direction of escape from each floor. There should also be appropriate audible and visual warning devices which operate on detection.

**SELF-CLOSING FIRE DOORS****(D3.14)(D4.7)(D5.8)(D6.7)(D11.1)(D11.2)(D11.3)(D11.4)(D11.5)**

The requirements of D3.14, D4.7, D5.8, D6.7, D11.1, D11.2, D11.3, D11.4 and D11.5 for a suitable self-closing *fire door* will be met by one which -

- a. is installed accord with the guidance in the Builders Hardware Industry Federation, Code of Practice, “Hardware for Timber Fire and Escape Doors”, and
- b. is only held in the open position by an automatic door release mechanism, if it complies with BS 5839: Part 3: 1988 and is not -
  - i. an *emergency door*, or
  - ii. a *protected door* serving the only *escape stair* in the *building* or the only *escape stair* serving a part of the *building*, or
  - iii. a door to a *fire-fighting shaft*.

**Note:** An automatic door release mechanism should be -

- A. activated by smoke detectors provided to the L2 standard complying with BS 5839: Part 1: 1988, or located on each side of the door and positioned not less than 500 mm and not more than 3 m from the door; and
- B. provided with a ready means of manual operation from a position at the door; and

**(D3.14, D4.7, D5.8, D6.7)**

- C. activated by any loss of power in the device, apparatus or switch; and
- D. activated on the operation of any fire alarm system and any loss of power or occurrence of a fault in that system.

**SERVICE OPENINGS****(D3.14)(D4.7)(D5.8)(D6.7)**

The requirements of D3.14, D4.7, D5.8 and D6.7 for a *service opening* other than for a ventilating *duct* will be met where the *building service* -

- a. has at least the level of fire safety performance required for the wall or floor; or
- b. is protected by a *construction* which has at least the level of fire safety performance required for the wall or floor provided by -
  - i. a casing which has the required level of fire safety performance from the outside, or
  - ii. where the level of fire safety performance required is medium duration, a casing which has short duration from each side, or
  - iii. where the level of fire safety performance required is long duration, a casing which has medium duration from each side; or
- c. is provided with an automatic heat activated sealing device which, in the event of fire, will maintain the level of fire safety performance in respect of integrity required for the wall or floor regardless of the diameter; or
- d. is a pipe, or in the case of i. below is a cable, which -
  - i. has a bore, or diameter, of not more than 40 mm and, where there are not more than 4 such pipes or cables, they are at least 40 mm apart and at least 100 mm from any other pipe or cable, or, where there are more than 4 such pipes or cables they are at least 100 mm apart, or
  - ii. has a bore of not more than 160 mm and is of iron, steel or copper, or of a material capable of with-standing 800° C without allowing flames or hot material to pass through the wall of the pipe, or
  - iii. is a branch pipe of a bore of not more than 110 mm to a vertical drainage or water service pipe, is of aluminium or aluminium alloy, or of uPVC to BS 4514: 1983 (1998), passes through a wall and the vertical pipe is enclosed throughout in a *construction* which has a level of fire safety performance as specified in sub-paragraph b. above or is protected in accordance with sub-paragraph c. above.

**Note:**

Where a pipe passing through a *service opening* is connected not more than 1 m from a wall or floor required to have a level of fire safety performance to another pipe to which a more onerous provision applies the pipe has to meet that more onerous provision.

The requirements of D3.14, D4.7, D5.8 and D6.7 for a *service opening* which is a ventilating *duct* will be met where it complies with the provisions of BS 5588: Part 9: 1999.

**Note:**

A *duct* passing through *sub-compartment* walls need not be provided with automatic shutters provided that the *duct* serves only 1 *sub-compartment* and the *duct* and its supports have a level of fire safety performance equivalent to that of the *sub-compartmentation*.

**FIRE-STOPPING****(D3.14)(D4.7)(D5.8)(D6.7)(D6.9)**

The requirements of D3.14, D4.7, D5.8 and D6.7 for *fire-stopping* of *service openings* and D6.9 for *fire-stopping* will be met in the case when -

- a. a minimal differential movement is anticipated by the use of -
  - i. cement mortar;
  - ii. gypsum based plaster;
  - iii. cement or gypsum based vermiculite/perlite mixes;
  - iv. glass fibre, crushed rock, blast furnace slag or ceramic based products (with or without resin binders); or
- b. when differential movement is anticipated, either in normal use or during fire exposure, by the use of a proprietary sealant or sealing system which has shown by test its ability to maintain the required level of fire safety performance under the conditions appropriate to its end use.

**Note:**

To prevent displacement, materials used for *fire-stopping* should be reinforced with, or supported by, *non-combustible* materials -

- i. where the unsupported span is more than 100 mm, and
- ii. where non-rigid materials are used, unless they have been shown by test within their field of application to be satisfactory.

**JUNCTION BETWEEN A COMPARTMENT WALL OR A SEPARATING WALL AND A ROOF**

**(D3.16)** The requirements of D3.16 and D5.10 for a suitable form of roof *construction* will be met where a **(D5.10)** *compartment wall* or *separating wall* projects through the roof to a distance of at least 375 mm above the top surface of the roof, **except -**

a *compartment wall* or *separating wall* may be taken to the underside of the roof substrate -

- a. in the case of a *non-combustible* substrate, where the junction is *fire-stopped* and the roof covering is low vulnerability (see D9) for a distance of at least 1.7 m to each side of the centreline of the wall; or
- b. in the case of a pitched roof covered by slates nailed directly to sarking and underlay, where the junction between sarking and wall-head is *fire-stopped*; or
- c. in the case of a pitched roof covered by slates or tiles fixed to tiling battens and any counter-battens, where only the tiling battens and underlay are carried over the wall and are fully bedded in mortar (or no less suitable material) at the wall-head.

**Note:**

BRE Housing Defects Prevention Unit "Defect Action Sheet (Design)" February 1985 (DAS 8) should be referred to in the case of c. above.

**(D7.1), (D7.2)****FIRE SPREAD ON INTERNAL LININGS**

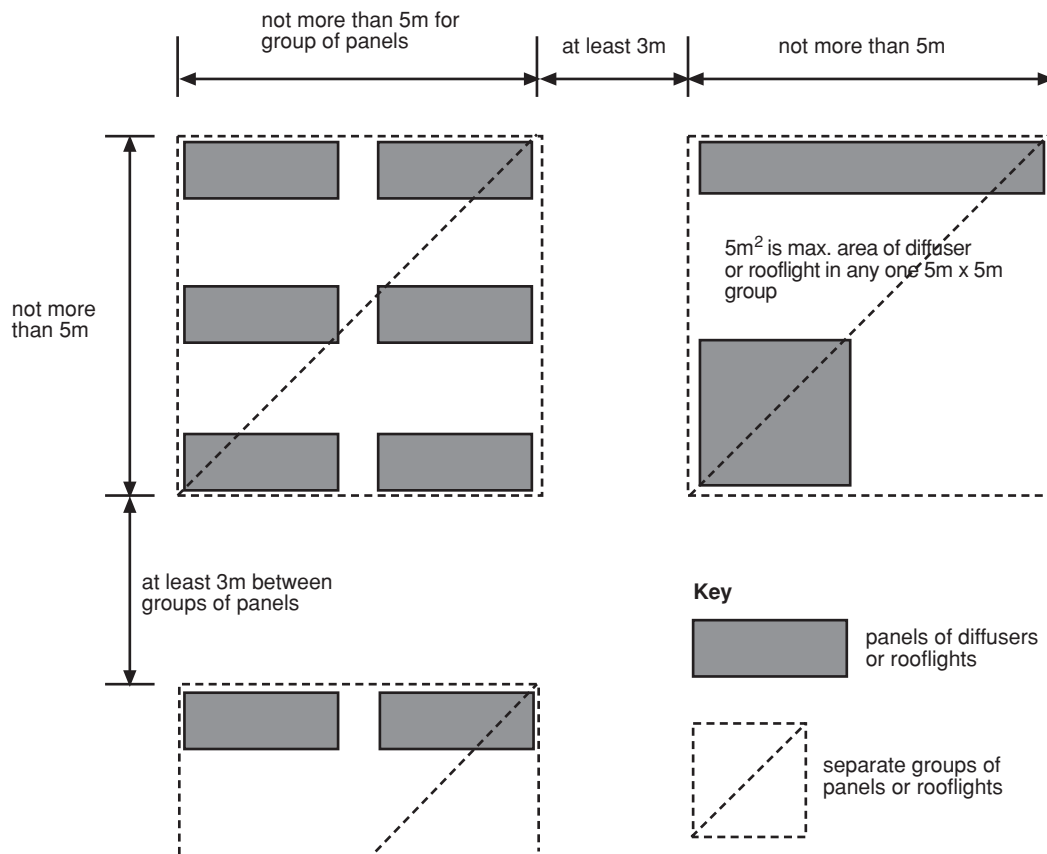
**(D7.1)** The requirements of D7.1 for suitable plastics *glazing* materials will be met by -

- a. rigid solid PVC (uPVC); or
- b. polycarbonate rigid solid sheet at least 3 mm thick; or
- c. multiskin polycarbonate sheet at least 10 mm thick overall which has a level of fire safety performance (see D1.3) of low risk or medium risk.

**(D7.2)** The requirements of D7.2 will be met by -

- a. a ceiling *constructed* from panels of thermoplastic materials, either as a suspended or stretched skin membrane, -
  - i. with a TP(a) flexible classification, and
  - ii with an area not more than 5 m<sup>2</sup>, and
  - iii which is supported on all its sides, and
  - iv. which is not in a *protected zone* or *fire-fighting shaft*;
- b. a rooflight *constructed* of thermoplastic materials with a size and disposition as indicated in the table and diagram to this standard;
- c. a light fitting with a diffuser *constructed* of thermoplastic materials which, -
  - i. does not form part of the ceiling and is so designed that the diffuser will fall out of its mounting when softened by heat, or
  - ii is a pendant fitting suspended beneath the ceiling, or
  - iii has a size and disposition as indicated in the table and diagram to this standard, or
  - iv. is part of a fire-resisting ceiling which has been satisfactorily tested as part of a ceiling system to provide appropriate fire protection.

**Diagram to (D7.2)b and c: Layout restrictions on thermoplastic rooflights and light fittings with diffusers**



**Note:**

1. Upper and lower surface of suspended ceiling, between plastic panels, to comply with D7.1.

**Table to (D7.2)b and c: Limitations applied to thermoplastic rooflights and light fittings with diffusers**

Use of space below the diffusers or rooflights	Minimum classification of lower surface	Maximum area of each diffuser panel or rooflight (m <sup>2</sup> ) [1]	Maximum total area of diffuser panels and rooflights as percentage of floor area of the space in which the ceiling is located (%)	Minimum separation distance between diffuser panels or rooflights (m) [1]
<i>Protected zone or fire-fighting shaft</i>	Any	Not permitted	Not permitted	Not permitted
<i>Unprotected zone or protected enclosure</i>	TP(a)rigid	No limit	No limit	No limit
	TP(a)flexible [3] and TP(b)	5	15 [2]	3
<i>Room</i>	TP(a)rigid	No limit	No limit	No limit
	TP(a)flexible [3] and TP(b)	5	50 [2]	3

**Notes:**

1. Smaller panels can be grouped together provided that the overall size of the group and the space between any others satisfies the dimensions shown in the diagram to (D7.2).
2. The minimum 3 m separation in the diagram to (D7.2) between each 5 m<sup>2</sup> should be maintained, therefore, in some cases it may not also be possible to use the maximum percentage quoted.
3. TP(a) flexible is not permitted in rooflights..

**Notes:**

1. A thermoplastic material means any synthetic material that has a softening point below 200° C if tested in accordance with Method 120A in BS 2782: Part 1: 1990. They may be classified TP(a) rigid, TP(a) flexible or TP(b) as follows -

**a.** TP(a) rigid -

- i. rigid solid,
- 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 a level of fire safety performance (see D1.3) of low risk or medium risk.
- iv. any other rigid thermoplastic product, a specimen of which (at the thickness of the product as put on the market), when tested in accordance with Method 508A in BS 2782: 1970 (1974) 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.

**b.** TP(a) flexible -

flexible products not more than 1mm thick which comply with the Type C requirements of BS 5867: Part 2: 1980 (1993) when tested in accordance with Test 2 in BS 5438: 1989 (1995) with the flame applied to the surface of the specimens for 5, 15, 20 and 30 seconds respectively, but excluding cleansing procedure.

- c. TP(b) -
  - i. rigid solid polycarbonate sheet products not more than 3mm thick, or multiple-skin polycarbonate sheet products which do not qualify as TP(a) by test,
  - ii. other products which, when a specimen of the material more than 1.5 mm and not more than 3 mm thick is tested in accordance with Method 508A in BS 2782: 1970 (1974), has a rate of burning which is not more than 50 mm/minute.
- 2. Thermoplastic rooflights may be subject also to D8.1, depending on their *boundary* distance, which may affect in particular the minimum separation between rooflights.

### **SANDWICH PANELS**

**(D7.4)** The requirements of D7.4 for a suitably designed and installed *sandwich panel* will be met when it is in accord with chapter 8 of “Design, Construction, Specification and Fire Management of Insulated Envelopes for Temperature Controlled Environments”, International Association of Cold Storage Contractors (European Division), 1999.

### **CALCULATION OF UNPROTECTED AREA**

**(D8.1)** Level A unprotected area is calculated in relation to the distance between the *external wall* or side of the *building* and the *boundary* in accordance with either -

- a. Method 1 or Method 2 below; or
- b. the Building Research Establishment Report “External fire spread: *building* separation and *boundary* distances: 1991: BR 187”.

Level B unprotected area is calculated in relation to the distance between the *external wall* or side of the *building* and the *boundary* in accordance with either -

- a. Method 2 below; or
- b. the Building Research Establishment Report “External fire spread: *building* separation and *boundary* distances: 1991: BR 187”.

Level C unprotected area is limited to -

- a. *ventilators* serving the wall, only because the wall is built as an *external wall*, which do not project beyond the *boundary*, and
- b. in a wall more than 500 mm from the *boundary* -
  - i. the *external wall* of a *protected zone*, and
  - ii. any area which is not more than 0.1 m<sup>2</sup>, and is at least 1.5 m from any other unprotected area in the same wall and in the same *compartment*, and
  - iii. any area, or areas, which add up to not more than 1 m<sup>2</sup>, and are at least 4 m from any other unprotected area or areas in the same wall and in the same *compartment*.

**(D8.1)****METHOD 1 - SIMPLE GEOMETRY**

This method applies only where the *building* is not more than 9 m in height and the maximum length of any side of the *building* facing the *boundary* is 24 m. The method is simple but restrictive and where failure is indicated Method 2 or the BRE Report methods should be applied. The *boundary* distance will be acceptable where the extent of the unprotected area and the minimum distance of any unprotected area from the boundary are within the limits shown in the Table to Method 1 -

**Table to Method 1: Permitted unprotected area in relationship to *boundary* distance**

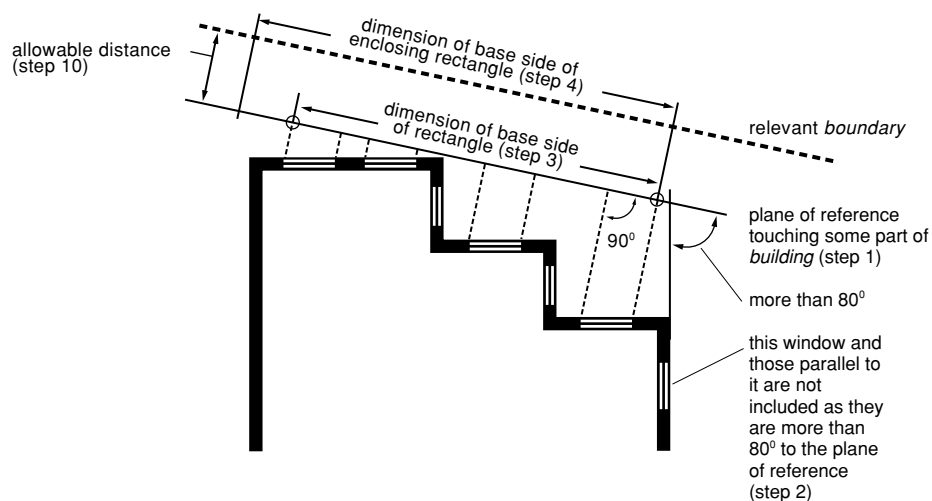
Maximum total unprotected area of <i>compartment</i> (m <sup>2</sup> )	Minimum distance between side of <i>building</i> and <i>boundary</i> (m)
5.6	1.0
12.0	2.0
18.0	3.0
24.0	4.0
30.0	5.0
No limit	6.0

**METHOD 2 - ENCLOSING RECTANGLES (GEOMETRIC METHOD)**

This method applies to a *building* or *compartment* more than 1 m from any point on the relevant *boundary*.

The method is based on the concept of enclosing rectangles (see below) and the use of Tables A and B to this method, in which the distances given relate to different levels of unprotected area permitted.

**Diagram 1 to Method 2: Establishing length of baseline of enclosing rectangle**

**Notes:**

1. Project on to the plane of reference the unprotected areas on all floors to find the dimension of the base side of the rectangle.
2. The relevant *boundary* could be a notional *boundary* depending on the use of the *building* and the circumstances.

Step 1 Establish a plane of reference which is the most favourable for the side of the *building* under consideration and which -

- a. touches all or part of the side;

- b. however far extended, does not pass within the *building* (but may pass through projections such as a balcony or coping); and
- c. does not cross the relevant *boundary*.

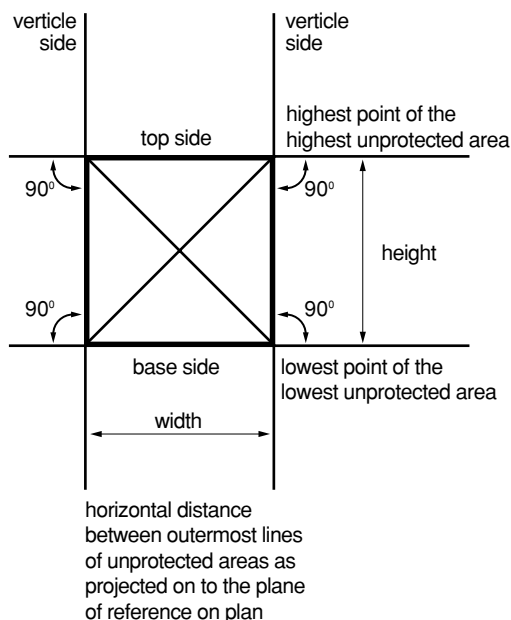
Normally it will be best for the plane of reference to be roughly parallel to the relevant *boundary*. (Where the *boundary* distance has not been set, an assumed relationship with the relevant *boundary* should be made.)

Step 2 On the plane of reference, and at right angles to it, project lines marking those proposed unprotected areas which are 80° or less to the plane of reference.

Step 3 *Construct* a rectangle which encloses all the unprotected areas projected on to the plane of reference and which complies with Diagrams 2 and 3 to Method 2:

**Diagram 2 to Method 2: Establishing enclosing rectangle**

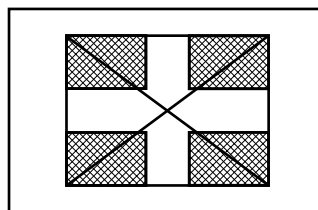
Diagram 2A shows the essentials in constructing the rectangle (shown by diagonal lines) enclosing the unprotected areas.



**2A Setting rectangle**

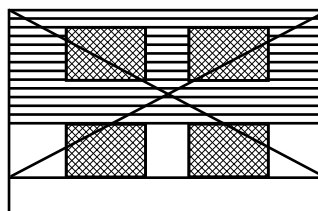
Diagrams 2B-2D show how the wall construction determines the size of the rectangle.

In the diagrams the relevant boundary is assumed as parallel with the wall face and the plane of reference to coincide with the wall face. But this will not always be so.



2B

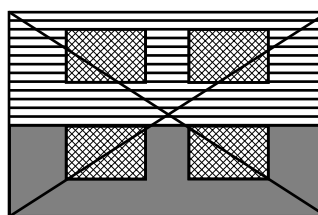
The whole of the solid wall area has the required duration.



2C

Combustible cladding on wall which does not have the required duration.

Unclad wall area has required duration.



2D

Whole of the wall area behind and below the combustible cladding does not have the required duration.

**Note:**

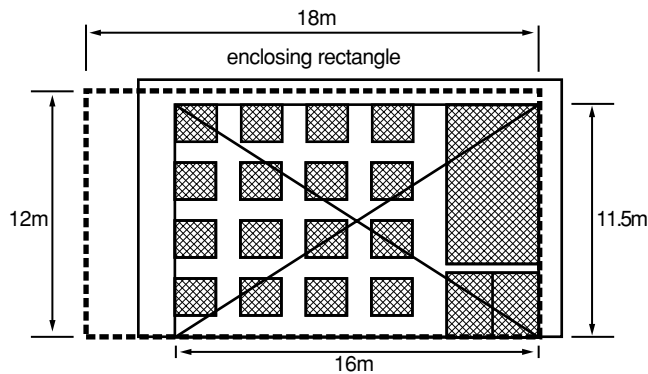
1. In diagrams 2C and 2D “combustible cladding” refers to a material, more than 1 mm thick attached or applied to the wall, whether for cladding or any other purpose, which is low, medium, high or very high risk (see D1.3).

Step 4 From Tables A or B to Method B, according to the use of the *building* or *compartment*, select an enclosing rectangle which is equal to, or next greater in both height and width to, the rectangle constructed under step 3. (The tables provide for enclosing rectangles of 3, 6, 9, 12, or 15 m high, with widths in steps from 3 m to no limit.)

(D8.1)

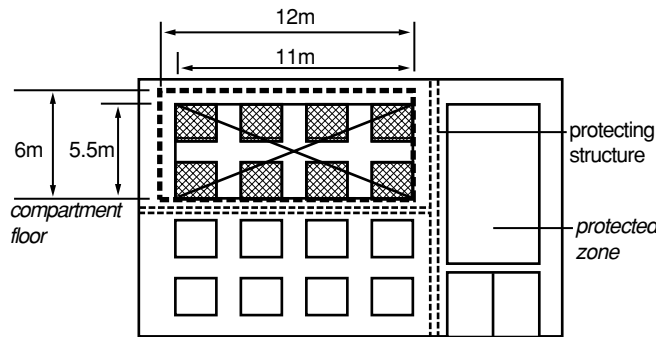
Diagram 3 to Method 2: Effects of *compartmentation*

Compartmentation of a building has a considerable effect on the distance which its sides (or *external walls*) may be from the relevant *boundary*. This is shown and explained in the following diagrams which assume a level A unprotected area.



3A Uncompartmented

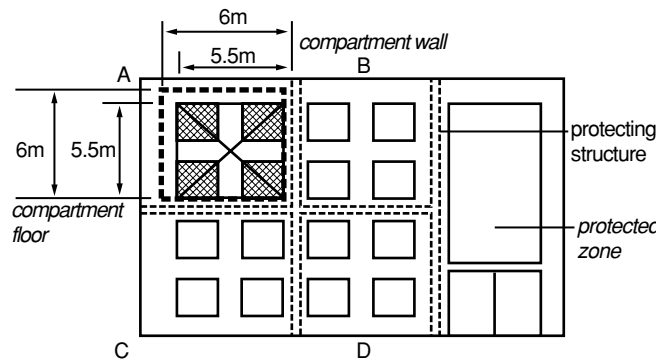
1. Assume rectangle (enclosing *unprotected areas*) = 11.5m x 16m
2. From Table A enclosing rectangle = 12m x 18m = 216m<sup>2</sup>.
3. Assume *unprotected areas* (shaded) = 105m<sup>2</sup>.
4. Unprotected percentage (*unprotected areas* as percentage of enclosing rectangle) = 105m<sup>2</sup> as percentage of 216m<sup>2</sup> = 48.6%; use 50% column in Table A.
5. From Table A distance from *boundary* = 6m (minimum).



3B Compartmented  
(assume compartmentation as shown)

- (a) As the entrance and the stairways are now isolated the area becomes a *protected zone* and the *glazed area* does not count as part of the *unprotected area*.
- (b) The remainder of the *building* is divided by the *compartment floor* into *compartments A* and *B*. In this example the *compartments* have the same *unprotected area*. But where there are 2 (or more) *compartments* with different *unprotected areas* take the compartment with the greatest *unprotected area*.

1. Assume rectangle = 5.5m x 11m.
2. From Table A enclosing rectangle = 6m x 12m = 72m<sup>2</sup>.
3. Assume *unprotected areas* = 26m<sup>2</sup>.
4. Unprotected percentage = 26m<sup>2</sup> as percentage of 72m<sup>2</sup> = 36%; use 40% column in Table A.
5. From Table A distance from *boundary* = 3m (minimum).



3C Compartmented  
(assume compartmentation as shown)

With the inclusion of a *compartment wall* the *building* is now divided into *compartments A, B, C* and *D* each having the same *unprotected area* for the purpose of this example.

1. Assume rectangle = 5.5m x 5.5m.
2. From Table A enclosing rectangle = 6m x 6m = 36m<sup>2</sup>.
3. Assume *unprotected areas* = 13m<sup>2</sup>.
4. Percentage of *unprotected area* = 36%; use 40% column in Table A.
5. From Table A distance from *boundary* = 2m (minimum).

**Note:**

1. In the above diagrams the relevant *boundary* is assumed as parallel with the wall face and the plane of reference to coincide with the wall face, but this will not always be so.

- Step 5 From the unprotected areas projected under step 2 -
- a.** calculate their total area (excluding any areas permitted under the allowance for Level C); and
  - b.** express this total area as a percentage of the enclosing rectangle. This gives the unprotected percentage.

Step 6 Proceed to steps 7 to 9 where the *boundary* distance has been set, or steps 10 to 12 where it has not.

To find the maximum unprotected area for a given *boundary* position -

Step 7 From Table A or B find the unprotected percentage allowed for the distance from the relevant *boundary*. (This distance relates to the plane of reference and not the side of the *building*, unless they coincide.)

Step 8 Where the proposed total unprotected area relative to the size of the enclosing rectangle exceeds the allowable unprotected percentage for that distance the design should be modified until an allowable unprotected percentage is established.

Step 9 Repeat the process for all sides of the *building* situated more than 1 m from any point on the relevant *boundary*.

To find the nearest position of the *boundary* for a given *building* -

Step 10 From Table A or B, find the minimum allowable distance for the unprotected percentage. (This distance relates to the plane of reference and not the side of the *building*, unless they coincide)

Step 11 Repeat the process for all sides of the *building*.

Step 12 Where these minimum distances are superimposed upon a plan of the *building*, a zone around the *building* is established upon which a *boundary* should not encroach.

## (D8.1)

**Table A to Method 2: Permitted unprotected percentages in relation to enclosing rectangles where a Level A amount of unprotected area is permitted.**

Height of enclosing rectangle (m)	Width of enclosing rectangle (m)	Minimum distance from relevant <i>boundary</i> (m) for unprotected percentage not more than -									
		20%	30%	40%	50%	60%	70%	80%	90%	100%	
3	3	1.0	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.0	
	6	1.0	1.0	1.5	2.0	2.0	2.0	2.5	2.5	3.0	
	9	1.0	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.5	
	12	1.0	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5	
	15	1.0	1.5	2.0	2.5	2.5	3.0	3.5	3.5	4.0	
	18	1.0	1.5	2.0	2.5	2.5	3.0	3.5	4.0	4.0	
	21	1.0	1.5	2.0	2.5	3.0	3.0	3.5	4.0	4.5	
	24	1.0	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.5	
	27	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.0	4.5	
	30	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.0	4.5	
	no limit	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.0	5.0	
	6	3	1.0	1.0	1.5	2.0	2.0	2.0	2.5	2.5	3.0
		6	1.0	1.5	2.0	2.5	3.0	3.0	3.5	4.0	4.0
		9	1.0	2.0	2.5	3.0	3.5	4.0	4.5	4.5	5.0
12		1.5	2.5	3.0	3.5	4.0	4.5	5.0	5.0	5.5	
15		1.5	2.5	3.0	4.0	4.5	5.0	5.5	5.5	6.0	
18		1.5	2.5	3.5	4.0	4.5	5.0	5.5	6.0	6.5	
21		1.5	2.5	3.5	4.0	5.0	5.5	6.0	6.5	7.0	
24		1.5	2.5	3.5	4.5	5.0	5.5	6.0	7.0	7.0	
27		1.5	2.5	3.5	4.5	5.0	6.0	6.5	7.0	7.5	
30		1.5	2.5	3.5	4.5	5.0	6.0	6.5	7.0	8.0	
40		1.5	2.5	3.5	4.5	5.5	6.5	7.0	8.0	8.5	
50		1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.0	9.0	
60		1.5	2.5	3.5	5.0	5.5	6.5	7.5	8.5	9.5	
80		1.5	2.5	3.5	5.0	6.0	7.0	7.5	8.5	9.5	
no limit	1.5	2.5	3.5	5.0	6.0	7.0	8.0	8.5	10.0		
9	3	1.0	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.5	
	6	1.0	2.0	2.5	3.0	3.5	4.0	4.5	4.5	5.0	
	9	1.5	2.5	3.5	4.0	4.5	5.0	5.5	5.5	6.0	
	12	1.5	3.0	3.5	4.5	5.0	5.5	6.0	6.5	7.0	
	15	2.0	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5	
	18	2.0	3.5	4.5	5.0	6.0	6.5	7.0	8.0	8.5	
	21	2.0	3.5	4.5	5.5	6.5	7.0	7.5	8.5	9.0	
	24	2.0	3.5	5.0	5.5	6.5	7.5	8.0	9.0	9.5	
	27	2.0	3.5	5.0	6.0	7.0	7.5	8.5	9.5	10.0	
	30	2.0	3.5	5.0	6.0	7.0	8.0	9.0	9.5	10.5	
	40	2.0	3.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	
	50	2.0	4.0	5.5	6.5	8.0	9.0	10.0	11.5	12.5	
	60	2.0	4.0	5.5	7.0	8.0	9.5	11.0	11.5	13.0	
	80	2.0	4.0	5.5	7.0	8.5	10.0	11.5	12.5	13.5	
100	2.0	4.0	5.5	7.0	8.5	10.0	11.5	12.5	14.5		
120	2.0	4.0	5.5	7.0	8.5	10.0	11.5	12.5	14.5		
no limit	2.0	4.0	5.5	7.0	8.5	10.5	12.0	12.5	15.0		

**Note:** The minimum distance from the *boundary* may be arrived at by interpolation between the percentages shown.

Table A to Method 2: Continued

Height of enclosing rectangle (m)	Width of enclosing rectangle (m)	Minimum distance from relevant <i>boundary</i> (m) for unprotected percentage not more than -								
		20%	30%	40%	50%	60%	70%	80%	90%	100%
12	3	1.0	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5
	6	1.5	2.5	3.0	3.5	4.0	4.5	5.0	5.0	5.5
	9	1.5	3.0	3.5	4.5	5.0	5.5	6.0	6.5	7.0
	12	1.5	3.5	4.5	5.0	6.0	6.5	7.0	7.5	8.0
	15	2.0	3.5	5.0	5.5	6.5	7.0	8.0	8.5	9.0
	18	2.5	4.0	5.0	6.0	7.0	7.5	8.5	9.0	10.0
	21	2.5	4.0	5.5	6.5	7.5	8.5	9.0	10.0	10.5
	24	2.5	4.5	6.0	7.0	8.0	8.5	9.5	10.5	11.5
	27	2.5	4.5	6.0	7.0	8.0	9.0	10.5	11.0	12.0
	30	2.5	4.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5
	40	2.5	5.0	6.5	8.0	9.5	10.5	12.0	13.0	14.0
	50	2.5	5.0	7.0	8.5	10.0	11.0	13.0	14.0	15.0
	60	2.5	5.0	7.0	9.0	10.5	12.0	13.5	14.5	16.0
	80	2.5	5.0	7.0	9.0	11.0	13.0	14.5	16.0	17.0
	100	2.5	5.0	7.5	9.5	11.5	13.5	15.0	16.5	18.0
	120	2.5	5.0	7.5	9.5	11.5	13.5	15.0	17.0	18.5
	no limit	2.5	5.0	7.5	9.5	12.0	14.0	15.5	17.0	19.0
15	3	1.0	1.5	2.0	2.5	2.5	3.0	3.5	3.5	4.0
	6	1.5	2.5	3.0	4.0	4.5	5.0	5.5	5.5	6.0
	9	2.0	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5
	12	2.0	3.5	5.0	5.5	6.5	7.0	8.0	8.5	9.0
	15	2.0	4.0	5.5	6.5	7.0	8.0	9.0	9.5	10.0
	18	2.5	4.5	6.0	7.0	8.0	8.5	9.5	10.5	11.0
	21	2.5	5.0	6.5	7.5	8.5	9.5	10.5	11.0	12.0
	24	3.0	5.0	6.5	8.0	9.0	10.0	11.0	12.0	13.0
	27	3.0	5.5	7.0	8.5	9.5	10.5	11.5	12.5	13.5
	30	3.0	5.5	7.5	8.5	10.0	11.0	12.0	13.5	14.0
	40	3.0	6.0	8.0	9.5	11.0	12.5	13.5	15.0	16.0
	50	3.5	6.0	8.5	10.0	12.0	13.5	15.0	16.5	17.5
	60	3.5	6.5	8.5	10.5	12.5	14.0	15.5	17.0	18.0
	80	3.5	6.5	9.0	11.0	13.5	15.0	17.0	18.5	20.0
	100	3.5	6.5	9.0	11.5	14.0	16.0	18.0	19.5	21.5
	120	3.5	6.5	9.0	11.5	14.0	16.5	18.5	20.5	22.5
	no limit	3.5	6.5	9.0	12.0	14.5	17.0	19.0	21.0	23.0

**Note:** The minimum distance from the *boundary* may be arrived at by interpolation between the percentages shown.

## (D8.1)

**Table B to Method 2: Permitted unprotected percentages in relation to enclosing rectangles where a Level B amount of unprotected area is permitted**

Height of enclosing rectangle (m)	Width of enclosing rectangle (m)	Minimum distance from relevant <i>boundary</i> (m) for unprotected percentage not more than -								
		20%	30%	40%	50%	60%	70%	80%	90%	100%
3	3	1.0	1.5	2.0	2.0	2.5	2.5	2.5	3.0	3.0
	6	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0
	9	1.5	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0
	12	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	5.5
	15	2.0	2.5	3.5	4.0	4.5	5.0	5.5	6.0	6.0
	18	2.0	2.5	3.5	4.0	5.0	5.0	6.0	6.5	6.5
	21	2.0	3.0	3.5	4.5	5.0	5.5	6.0	6.5	7.0
	24	2.0	3.0	3.5	4.5	5.0	5.5	6.0	7.0	7.5
	27	2.0	3.0	4.0	4.5	5.5	6.0	6.5	7.0	7.5
	30	2.0	3.0	4.0	4.5	5.5	6.0	6.5	7.5	8.0
	40	2.0	3.0	4.0	5.0	5.5	6.5	7.0	8.0	8.5
	50	2.0	3.0	4.0	5.0	6.0	6.5	7.5	8.0	9.0
	60	2.0	3.0	4.0	5.0	6.0	7.0	7.5	8.5	9.5
	80	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	9.5
no limit	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	
6	3	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0
	6	2.0	3.0	3.5	4.0	4.5	5.0	5.5	5.5	6.0
	9	2.5	3.5	4.5	5.0	5.5	6.0	6.0	7.0	7.0
	12	3.0	4.0	5.0	5.5	6.5	7.0	7.5	8.0	8.5
	15	3.0	4.5	5.5	6.0	7.0	7.5	8.0	9.0	9.0
	18	3.5	4.5	5.5	6.5	7.5	8.0	9.0	9.5	10.0
	21	3.5	5.0	6.0	7.0	8.0	9.0	9.5	10.0	10.5
	24	3.5	5.0	6.0	7.0	8.5	9.5	10.0	10.5	11.0
	27	3.5	5.0	6.5	7.5	8.5	9.5	10.5	11.0	12.0
	30	3.5	5.0	6.5	8.0	9.0	10.0	11.0	12.0	12.5
	40	3.5	5.5	7.0	8.5	10.0	11.0	12.0	13.0	14.0
	50	3.5	5.5	7.5	9.0	10.5	11.5	13.0	14.0	15.0
	60	3.5	5.5	7.5	9.5	11.0	12.0	13.5	15.0	16.0
	80	3.5	6.0	7.5	9.5	11.5	13.0	14.5	16.0	17.5
100	3.5	6.0	8.0	10.0	12.0	13.5	15.0	16.5	18.0	
120	3.5	6.0	8.0	10.0	12.0	14.0	15.5	17.0	19.0	
no limit	3.5	6.0	8.0	10.0	12.0	14.0	16.0	18.0	19.0	
9	3	1.5	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0
	6	2.5	3.5	4.5	5.0	5.5	6.0	6.5	7.0	7.0
	9	3.5	4.5	5.5	6.0	6.5	7.5	8.0	8.5	9.0
	12	3.5	5.0	6.0	7.0	7.5	8.5	9.0	9.5	10.5
	15	4.0	5.5	6.5	7.5	8.5	9.5	10.0	11.0	11.5
	18	4.5	6.0	7.0	8.5	9.5	10.0	11.0	12.0	12.5
	21	4.5	6.5	7.5	9.0	10.0	11.0	12.0	13.0	13.5
	24	5.0	6.5	8.0	9.5	11.0	12.0	13.0	13.5	14.5
	27	5.0	7.0	8.5	10.0	11.5	12.5	13.5	14.5	15.0
	30	5.0	7.0	9.0	10.5	12.0	13.0	14.0	15.0	16.0
	40	5.5	7.5	9.5	11.5	13.0	14.5	15.5	17.0	17.5
	50	5.5	8.0	10.0	12.5	14.0	15.5	17.0	18.5	19.5
	60	5.5	8.0	11.0	13.0	15.0	16.5	18.0	19.5	21.0
	80	5.5	8.5	11.5	13.5	16.0	17.5	19.5	21.5	23.0
100	5.5	8.5	11.5	14.5	16.5	18.5	21.0	22.5	24.5	
120	5.5	8.5	11.5	14.5	17.0	19.5	21.5	23.5	26.0	
no limit	5.5	8.5	11.5	15.0	17.5	20.0	22.5	24.5	27.0	

**Note:** The minimum distance from the *boundary* may be arrived at by interpolation between the percentages shown.

Table B to Method 2: Continued

Height of enclosing rectangle (m)	Width of enclosing rectangle (m)	Minimum distance from relevant <i>boundary</i> (m) for unprotected percentage not more than -								
		20%	30%	40%	50%	60%	70%	80%	90%	100%
12	3	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	5.5
	6	3.0	4.0	5.0	5.5	6.5	7.0	7.5	8.0	8.5
	9	3.5	5.0	6.0	7.0	7.5	8.5	9.0	9.5	10.5
	12	4.5	6.0	7.0	8.0	9.0	9.5	11.0	11.5	12.0
	15	5.0	6.5	8.0	9.0	10.0	11.0	12.0	13.0	13.5
	18	5.0	7.0	8.5	10.0	11.0	12.0	13.0	14.0	14.5
	21	5.5	7.5	9.0	10.5	12.0	13.0	14.0	15.0	16.0
	24	6.0	8.0	9.5	11.5	12.5	14.0	15.0	16.0	16.5
	27	6.0	8.0	10.5	12.0	13.5	14.5	16.0	17.0	17.5
	30	6.5	8.5	10.5	12.5	14.0	15.0	16.5	17.5	18.5
	40	6.5	9.5	12.0	14.0	15.5	17.5	18.5	20.0	21.0
	50	7.0	10.0	13.0	15.0	17.0	19.0	20.5	23.0	23.0
	60	7.0	10.5	13.5	16.0	18.0	20.0	21.5	23.5	25.0
	80	7.0	11.0	14.5	17.0	19.5	21.5	23.5	26.0	27.5
	100	7.5	11.5	15.0	18.0	21.0	23.0	25.5	28.0	30.0
	120	7.5	11.5	15.0	18.5	22.0	24.0	27.0	29.5	31.5
no limit	7.5	12.0	15.5	19.0	22.5	25.0	28.0	30.5	34.0	
15	3	2.0	2.5	3.5	4.0	4.5	5.0	5.5	6.0	6.0
	6	3.0	4.5	5.5	6.0	7.0	7.5	8.0	9.0	9.0
	9	4.0	5.5	6.5	7.5	8.5	9.5	10.0	11.0	11.5
	12	5.0	6.5	8.0	9.0	10.0	11.0	12.0	13.0	13.5
	15	5.5	7.0	9.0	10.0	11.5	12.5	13.5	14.5	15.0
	18	6.0	8.0	9.5	11.0	12.5	13.5	14.5	15.5	16.5
	21	6.5	8.5	10.5	12.0	13.5	14.5	16.0	16.5	17.5
	24	6.5	9.0	11.0	13.0	14.5	15.5	17.0	18.0	19.0
	27	7.0	9.5	11.5	13.5	15.0	16.5	18.0	19.0	20.0
	30	7.5	10.0	12.0	14.0	16.0	17.0	18.5	20.0	21.0
	40	8.0	11.0	13.5	16.0	18.0	19.5	21.0	22.5	23.5
	50	8.5	12.0	15.0	17.5	19.5	21.5	23.0	25.0	26.0
	60	8.5	12.5	15.5	18.0	21.0	23.5	25.0	27.0	28.0
	80	9.0	13.5	17.0	20.0	23.0	25.5	28.0	30.0	31.5
	100	9.0	14.0	18.0	21.5	24.5	27.5	30.0	32.5	34.5
	120	9.0	14.0	18.5	22.5	25.5	28.5	31.5	34.5	37.0
no limit	9.0	14.5	19.0	23.0	27.0	30.0	34.0	36.0	39.0	

**Note:** The minimum distance from the *boundary* may be arrived at by interpolation between the percentages shown.

**(D9.1)****FIRE SAFETY OF ROOFS AND ROOFLIGHTS**

**(D9.1)** The requirement of D9.1 for roofs and rooflights will be met by the following classification -

**Low vulnerability -**

- a.** designation AA, AB or AC when tested along with the substrate in accordance with BS 476: Part 3: 1958; or
- b.** glass at least 4mm thick; or
- c.** a roof covering or rooflight of plastics materials which is in an open canopy or over a substantially open area such as a loading bay or in the roof of a detached swimming pool enclosure which is -
  - i.** a single-skin polycarbonate sheet not more than 3 mm thick or multi-skin polycarbonate sheet, or
  - ii.** a thermoplastic material (see Note): a specimen of which when tested in accordance with Method 508A in BS2782: 1970 (1974), performs so that the test flame does not reach the second mark within 2 minutes, the specimen thickness to be more than 1.5 mm and not more than 3.0 mm; or
- d.** thermoplastic sheet with a level of fire safety performance (see D1.3) of low or medium risk which is -
  - i.** a plastics material, or
  - ii.** a rigid solid PVC (uPVC), or
  - iii.** a polycarbonate rigid solid sheet at least 3 mm thick, or
  - iv.** a multiskin polycarbonate sheet at least 10 mm thick overall.

**Medium vulnerability -**

- a.** designation BA, BB, BC, CA, CB or CC when tested along with the substrate in accordance with BS 476: Part 3: 1958; or
- b.** a roof covering or rooflight of plastics materials which is -
  - i.** a single-skin polycarbonate sheet not more than 3 mm thick or multi-skin polycarbonate sheet, or
  - ii.** thermoplastic material (see Note): a specimen of which when tested in accordance with Method 508A in BS2782: 1970 (1974), performs so that the test flame does not reach the second mark within 2 minutes, the specimen thickness to more than 1.5 mm and not more than 3.0 mm.

**High vulnerability -**

A roof or rooflight which does not meet the criteria for medium or low vulnerability.

**Note:**

A thermoplastic material means any synthetic material that has a softening point below 200° C when tested in accordance with Method 120A in BS 2782: Part1: 1990.

**TEST FOR THE FIRE SAFETY PERFORMANCE OF EXTERNAL CLADDING SYSTEMS**

**(D10.1)** The requirements of D10.1b. for a suitable test for the fire safety performance of external cladding systems will be met by one complying with BRE Fire Note 9 Assessing the fire performance of external cladding systems (BRE, 1999).

**SAFETY CURTAINS**

**(D11.13)** The requirements of D11.13 for a suitable safety curtain is one which conforms with Clause 13 of Section 5 of BS 5588: Part 6: 1991.

**VENTILATION SYSTEM**

**(D11.14)** The requirements of D11.14 for a suitably designed ventilation system will be met by a ventilation system which conforms to Clause 20 of Section 6 of BS 5588: Part 6: 1991.

**SMOKE OUTLET**

**(D11.15)** The requirements of D11.15 for a suitable high level outlet over the stage will be met by conforming to the provisions of Clause 30.2.4 of Section 7 of BS 5588: Part 6: 1991.

