

Section 6: Wall and ceiling linings

Classification of linings

6.1 Subject to the variations and specific provisions described in paragraphs 6.2 to 6.16, the surface linings of walls and ceilings should meet the following classifications:

Location	National class ⁽¹⁾	European class ⁽¹⁾⁽³⁾⁽⁴⁾
Small rooms ⁽²⁾ of area not more than: a. 4m ² in residential accommodation b. 30m ² in non-residential accommodation	3	D-s3, d2
Other rooms ⁽²⁾ (including garages)	1	C-s3, d2
Circulation spaces within dwellings		
Other circulation spaces, including the common areas of blocks of flats	0	B-s3, d2

Notes:

1. See paragraph B2.v.
2. For meaning of room, see definition in Appendix E.
3. The National classifications do not automatically equate with the equivalent classifications in the European column, therefore, products cannot typically assume a European class, unless they have been tested accordingly.
4. When a classification includes 's3, d2', this means that there is no limit set for smoke production and/or flaming droplets/particles.

Definition of walls

6.2 For the purpose of the performance of wall linings, a wall includes:

- a. the surface of glazing (except glazing in doors); and
- b. any part of a ceiling which slopes at an angle of more than 70° to the horizontal.

But a wall does not include:

- c. doors and door frames;
- d. window frames and frames in which glazing is fitted;
- e. architraves, cover moulds, picture rails, skirtings and similar narrow members; or
- f. fireplace surrounds, mantle shelves and fitted furniture.

Definition of ceilings

6.3 For the purposes of the performance of ceiling linings, a ceiling includes:

- a. the surface of glazing;
- b. any part of a wall which slopes at an angle of 70° or less to the horizontal;
- c. the underside of a mezzanine or gallery; and
- d. the underside of a roof exposed to the room below.

But a ceiling does not include:

- e. trap doors and their frames;
- f. the frames of windows or rooflights (see Appendix E) and frames in which glazing is fitted; or
- g. architraves, cover moulds, picture rails, exposed beams and similar narrow members.

Variations and special provisions

Walls

6.4 Parts of walls in rooms may be of a poorer performance than specified in paragraph 6.1 and Table 10 (but not poorer than Class 3 (National class) or Class D-s3, d2 (European class)), provided the total area of those parts in any one room does not exceed one half of the floor area of the room; and subject to a maximum of 20m² in residential accommodation and 60m² in non-residential accommodation.

Fire-protecting suspended ceilings

6.5 A suspended ceiling can contribute to the overall fire resistance of a floor/ceiling assembly. Such a ceiling should satisfy paragraph 6.1 and Table 10. It should also meet the provisions of Appendix A, Table A3.

Fire-resisting ceilings

6.6 Cavity barriers are needed in some concealed floor or roof spaces (see Section 9); however, this need can be reduced by the use of a fire-resisting ceiling below the cavity. Such a ceiling should comply with Diagram 35.

Rooflights

6.7 Rooflights should meet the relevant classification in 6.1 and Table 10. However plastic rooflights with at least a Class 3 rating may be used where 6.1 calls for a higher standard, provided the limitations in Table 11 and Table 18 are observed.

Note: No guidance is currently possible on the performance requirements in the European fire tests as there is no generally accepted test and classification procedure.

Special applications

6.8 Any flexible membrane covering a structure (other than an air supported structure) should comply with the recommendations given in Appendix A of BS 7157:1989.

6.9 Guidance on the use of PTFE-based materials for tension-membrane roofs and structures is given in a BRE report *Fire safety of PTFE-based materials used in buildings* (BR 274, BRE 1994).

Thermoplastic materials

General

6.10 Thermoplastic materials (see Appendix A, paragraph 17) which cannot meet the performance given in Table 10, can nevertheless be used in windows, rooflights and lighting diffusers in suspended ceilings if they comply with the provisions described in paragraphs 6.11 to 6.15. Flexible thermoplastic material may be used in panels to form a suspended ceiling if it complies with the guidance in paragraph 6.16. The classifications used in paragraphs 6.11 to 6.16, Table 11 and Diagram 27 are explained in Appendix A, paragraph 20.

Note: No guidance is currently possible on the performance requirements in the European fire tests as there is no generally accepted test and classification procedure.

Windows and internal glazing

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

Internal glazing should meet the provisions in paragraph 6.1 and Table 10 above.

Note 1: A "wall" does not include glazing in a door (see paragraph 6.2).

Note 2: Attention is drawn to the guidance on the safety of glazing in Approved Document N *Glazing – safety in relation to impact, opening and cleaning*.

Rooflights

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

- the lower surface has a TP(a) (rigid) or TP(b) classification;
- the size and disposition of the rooflights accords with the limits in Table 11 and with the guidance to B4 in Tables 17 and 18.

Lighting diffusers

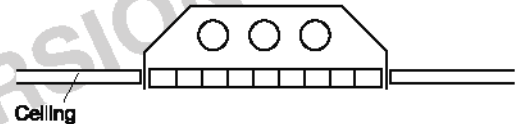
6.13 The following provisions apply to lighting diffusers which form part of a ceiling and are not concerned with diffusers of light fittings which are attached to the soffit of, or suspended beneath, a ceiling (see Diagram 26).

Lighting diffusers are translucent or open-structured elements that allow light to pass through. They may be part of a luminaire or used below rooflights or other sources of light.

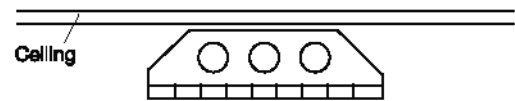
Diagram 26 **Lighting diffuser in relation to ceiling**

See para 6.13

a. DIFFUSER FORMING PART OF CEILING



b. DIFFUSER IN FITTING BELOW AND NOT FORMING PART OF CEILING



6.14 Thermoplastic lighting diffusers should not be used in fire-protecting or fire-resisting ceilings, unless they have been satisfactorily tested as part of the ceiling system that is to be used to provide the appropriate fire protection.

6.15 Subject to the above paragraphs, ceilings to rooms and circulation spaces (but not protected stairways) may incorporate thermoplastic lighting diffusers if the following provisions are observed:

- Wall and ceiling surfaces exposed within the space above the suspended ceiling (other than the upper surfaces of the thermoplastic panels) should comply with the general provisions of paragraph 6.1 and Table 10, according to the type of space below the suspended ceiling.
- If the diffusers are of classification TP(a) (rigid), there are no restrictions on their extent.
- If the diffusers are of classification TP(b), they should be limited in extent as indicated in Table 11 and Diagram 27.

Suspended or stretched-skin ceilings

6.16 The ceiling of a room may be constructed either as a suspended or as a stretched skin membrane from panels of a thermoplastic material of the TP(a) flexible classification, provided that it is not part of a fire-resisting ceiling. Each panel should not exceed 5m² in area and should be supported on all its sides.

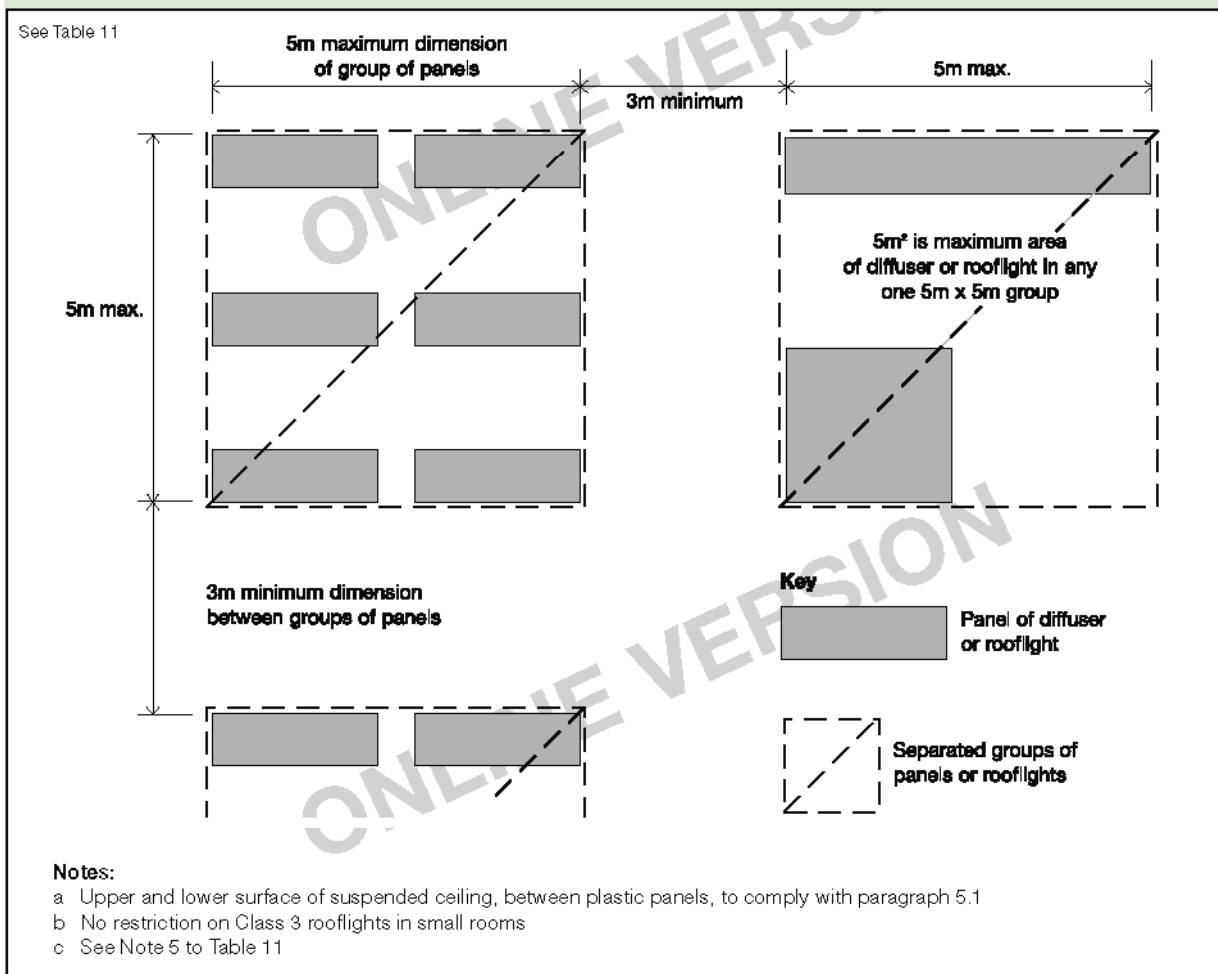
Table 11 Limitations applied to thermoplastic rooflights and lighting diffusers in suspended ceilings and Class 3 plastic rooflights

Minimum classification of lower surface	Use of space below the diffusers or rooflight	Maximum area of each diffuser panel or rooflight ⁽¹⁾ (m ²)	Max 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 ⁽¹⁾ (m)
TP(a)	Any except protected stairway	No limit ⁽²⁾	No limit	No limit
Class 3 ⁽³⁾ or TP(b)	Rooms	5	50 ⁽⁴⁾⁽⁵⁾	3 ⁽⁵⁾
	Circulation spaces except protected stairways	5	15 ⁽⁴⁾	3

Notes:

- Smaller panels can be grouped together provided that the overall size of the group and the space between one group and any others satisfies the dimensions shown in Diagram 27.
- Lighting diffusers of TP(a) flexible rating should be restricted to panels of not more than 5m² each, see paragraph 6.16.
- There are no limits on Class 3 material in small rooms. See paragraph 6.1, Table 10.
- The minimum 3m separation specified in Diagram 27 between each 5m² must be maintained. Therefore, in some cases it may not also be possible to use the maximum percentage quoted.
- Class 3 rooflights to rooms in industrial and other non-residential purpose groups may be spaced 1800mm apart provided the rooflights are evenly distributed and do not exceed 20% of the area of the room.

Diagram 27 Layout restrictions on Class 3 plastic rooflights, TP(b) rooflights and TP(b) lighting diffusers



Some roof covering products (and/or materials) can be considered to fulfil all of the requirements for the performance characteristic "external fire performance" without the need for testing, subject to any national provisions on the design and execution of works being fulfilled. These roof covering products are listed in Commission Decision 2000/553/EC of 6th September 2000 implementing Council Directive 89/106/EEC as regards the external fire performance of roof coverings.

In some circumstances roofs, or parts of roofs, may need to be fire-resisting, for example if used as an escape route or if the roof performs the function of a floor. Such circumstances are covered in Sections 2, 4 and 6.

Table A5 gives notional designations of some generic roof coverings.

Reaction to fire

7 Performance in terms of reaction to fire to be met by construction products is determined by Commission Decision 200/147/EC of 8th February 2000 implementing Council Directive 89/106/EEC as regards the classification of the reaction to fire performance of construction products.

Note: The designation of xxxx is used for the year reference for standards that are not yet published. The latest version of any standard may be used provided that it continues to address the relevant requirements of the Regulations.

All products, excluding floorings, are classified as [†]A1, A2, B, C, D, E or F (with class A1 being the highest performance and F being the lowest) in accordance with BS EN 13501-1:2002, *Fire classification of construction products and building elements, Part 1 – Classification using data from reaction to fire tests*.

The relevant European test methods are specified as follows,

BS EN ISO 1182:2002, *Reaction to fire tests for building products – Non-combustibility test*.

BS EN ISO 1716:2002, *Reaction to fire tests for building products – Determination of the gross calorific value*.

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

BS EN ISO 11925-2:2002, *Reaction to fire tests for building Products, Part 2 – Ignitability when subjected to direct impingement of a flame*.

BS EN 13238:2001, *Reaction to fire tests for building products – conditioning procedures and general rules for selection of substrates*.

Non-combustible materials

8 Non-combustible materials are defined in Table A6 either as listed products, or in terms of performance:

- a. (National classes) when tested to BS 476-4:1970 *Non-combustibility test for materials* or BS 476-11:1982 *Method for assessing the heat emission from building products*; or
- b. (European classes) when classified as class A1 in accordance with BS EN 13501-1:2002, *Fire classification of construction products and building elements, Part 1-Classification using data from reaction to fire tests* when tested to BS EN ISO 1182:2002, *Reaction to fire tests for building products – Non-combustibility test* and BS EN ISO 1716:2002 *Reaction to fire tests for building products – Determination of the gross calorific value*.

Table A6 identifies non-combustible products and materials and lists circumstances where their use is necessary.

Materials of limited combustibility

9 Materials of limited combustibility are defined in Table A7:

- a. (National classes) by reference to the method specified in BS 476: Part 11:1982; or
- b. (European classes) in terms of performance when classified as class A2-s3, d2 in accordance with BS EN 13501-1:2002, *Fire classification of construction products and building elements, Part 1 – Classification using data from reaction to fire tests* when tested to BS EN ISO 1182:2002, *Reaction to fire tests for building products – Non-combustibility test* or BS EN ISO 1716:2002 *Reaction to fire tests for building products – Determination of the gross calorific value* and BS EN 13823:2002, *Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item*.

Table A7 also includes composite products (such as plasterboard) which are considered acceptable and where these are exposed as linings they should also meet any appropriate flame spread rating.

Internal linings

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

11 Under the National classifications, lining systems which can be effectively tested for 'surface spread of flame' are rated for performance by reference to the method specified in BS 476-7:1971 *Surface spread of flame tests for materials*, or 1987 *Method for classification of the surface spread of flame of products*, or 1997

[†] The classes of reaction to fire performance of A2, B, C, D and E are accompanied by additional classifications related to the production of smoke (s1, s2, s3) and/or flaming droplets/particles (d0, d1, d2).

Method of test to determine the classification of the surface spread of flame of products under which materials or products are classified 1, 2, 3 or 4 with Class 1 being the highest.

Under the European classifications, lining systems are classified in accordance with BS EN 13501-1:2002, *Fire classification of construction products and building elements, Part 1 – Classification using data from reaction to fire tests*. Materials or products are classified as A1, A2, B, C, D, E or F, with A1 being the highest. When a classification includes “s3, d2”, it means that there is no limit set for smoke production and/or flaming droplets/particles.

12 To restrict the use of materials which ignite easily, which have a high rate of heat release and/or which reduce the time to flashover, maximum acceptable ‘fire propagation’ indices are specified, where the National test methods are being followed. These are determined by reference to the method specified in BS 476-6:1981 or 1989 *Method of test for fire propagation of products*. Index of performance (I) relates to the overall test performance, whereas sub-index (I1) is derived from the first three minutes of test.

13 The highest National product performance classification for lining materials is Class 0. This is achieved if a material or the surface of a composite product is either:

- composed throughout of materials of limited combustibility; or
- a Class 1 material which has a fire propagation index (I) of not more than 12 and sub-index (I1) of not more than 6.

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

14 Composite products defined as materials of limited combustibility (see paragraph 9 above and Table A7) should in addition comply with the test requirement appropriate to any surface rating specified in the guidance on requirements B2, B3 and B4.

15 The notional performance ratings of certain widely used generic materials or products are listed in Table A8 in terms of their performance in the traditional lining tests BS 476 Parts 6 and 7 or in accordance with BS EN 13501-1:2002, *Fire classification of construction products and building elements, Part 1 – Classification using data from reaction to fire tests*.

16 Results of tests on proprietary materials are frequently given in literature available from manufacturers and trade associations.

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

Thermoplastic materials

17 A thermoplastic material means any synthetic polymeric material which has a softening point below 200°C if tested to BS EN ISO 306:2004 method A120 *Plastics – Thermoplastic materials – Determination of Vicat softening temperature*. Specimens for this test may be fabricated from the original polymer where the thickness of material of the end product is less than 2.5mm.

18 A thermoplastic material in isolation can not be assumed to protect a substrate, when used as a lining to a wall or ceiling. The surface rating of both products must therefore meet the required classification. If however, the thermoplastic material is fully bonded to a non-thermoplastic substrate, then only the surface rating of the composite will need to comply.

19 Concessions are made for thermoplastic materials used for window glazing, rooflights and lighting diffusers within suspended ceilings, which may not comply with the criteria specified in paragraphs 11 onwards. They are described in the guidance on requirements B2 and B4.

20 For the purposes of the requirements B2 and B4 thermoplastic materials should either be used according to their classification 0-3, under the BS 476: Parts 6 and 7 tests as described in paragraphs 11 onwards, (if they have such a rating), or they may be classified TP(a) rigid, TP(a) flexible, or TP(b) according to the following methods:

TP(a) rigid:

- rigid solid PVC sheet;
- solid (as distinct from double- or multiple-skin) polycarbonate sheet at least 3mm thick;
- multi-skinned rigid sheet made from unplasticised PVC or polycarbonate which has a Class 1 rating when tested to BS 476-7:1971, 1987 or 1997; or
- any other rigid thermoplastic product, a specimen of which (at the thickness of the product as put on the market), when tested to BS 2782-0:2004 Method 508A *Rate of burning, Laboratory method*, performs so that the test flame extinguishes before the first mark and the duration of flaming or afterglow does not exceed 5 seconds following removal of the burner.

TP(a) flexible:

Flexible products not more than 1mm thick which comply with the Type C requirements of BS 5867-2:1980 *Specification for fabrics for curtains and drapes – Flammability requirements* when tested to BS 5438:1989 *Methods of test for flammability of textile fabrics when subjected to a small igniting flame applied to the face or bottom edge of vertically oriented specimens*, Test 2, with the flame applied to the surface of the specimens for 5, 15, 20 and 30 seconds respectively, but excluding the cleansing procedure; and

TP(b):

- i. rigid solid polycarbonate sheet products less than 3mm thick, or multiple-skin polycarbonate sheet products which do not qualify as TP(a) by test; or
- ii. other products which, when a specimen of the material between 1.5 and 3mm thick is tested in accordance with BS 2782-0:2004 Method 508A, has a rate of burning which does not exceed 50mm/minute.

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

Note: Currently, no new guidance is possible on the assessment or classification of thermoplastic materials under the European system since there is no generally accepted European test procedure and supporting comparative data.

Fire test methods

21 A guide to the various test methods in BS 476 and BS 2782 is given in PD 6520: *Guide to fire test methods for building materials and elements of construction* (available from the British Standards Institution).

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