

## Section 5 – Non-combustibility

### Subsection E10 – Non-combustibility

#### Clause E10.1

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Any product that complies with one of the following is considered to be non-combustible:

- (a) Class A1 in BS-EN 13501-1:2007, *Fire classification of construction products and building elements - Classification using data from reaction to fire tests*;
- (b) BS EN ISO 1182:2010, *Reaction to fire tests for products. Non-combustibility test and BS EN ISO 1716:2010 Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value)*;
- (c) BS 476-4:1970, *Fire tests on building materials and structures. Part 4: Non-combustibility test for materials*.

#### **Commentary**

Other appropriate non-combustibility tests include:

- (a) AS 1530.1:1994, *Methods for fire tests on building materials, components and structures Part 1: Combustibility test for materials*;
- (b) ASTM E136–11, *Standard test method for behavior of materials in a vertical tube furnace at 750°C*.

### Subsection E11- Limited Combustibility

#### Clause E11.1

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Materials of limited combustibility are classified as Class A2-s3, d2 or better in accordance with:

- (a) BS EN 13501-1:2007, *Fire classification of construction products and building elements, Part 1 – Classification using data from reaction to fire tests to BS EN ISO 1182:2002, Reaction to fire tests for building products – Non-combustibility test*;
- (b) BS EN ISO 1716:2010, *Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value)* and BS EN 13823:2010, *Reaction to fire tests for building products. Building products excluding floorings exposed to the thermal attack by a single burning item*.

### Commentary

The European classifications are developed through a suite of fire tests. Building elements except flooring, are classified as A1, A2, B, C, D, E or F (with A1 being the highest performance and F being the lowest) in accordance with BS EN 13501-1:2007, *Fire classification of construction products and building elements, Classification using data from reaction to fire tests*.

The relevant fire tests are:

- (a) BS EN ISO 1182:2010, *Reaction to fire tests for products. Non-combustibility test*,
- (b) BS EN ISO 1716:2010, *Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value)*;
- (c) BS EN 13823:2010, *Reaction to fire tests for building products. Building products excluding floorings exposed to the thermal attack by a single burning item*;
- (d) BS EN ISO 11925-2:2010, *Reaction to fire tests. Ignitability of building products subjected to direct impingement of flame. Single-flame source test*;
- (e) BS EN 13238:2010, *Reaction to fire tests for building products. Conditioning procedures and general rules for selection of substrates*.

The European test methods are based on performance in the ISO 9705, *Room Corner Test*. Products tested in accordance with the room corner test (ISO 9705), in tandem with the Cone Calorimeter (ISO 5660-1) are acceptable.

Table E1 is the comparison of classification of fire performance of materials tested in accordance with BS EN 13501-1:2007 and BS 476: Parts 4 and 7.

**Table E1 - European Classes on Reaction to Fire Performance**

<b>European Classification</b>	<b>British Standard Equivalent</b>
A1	Non-combustible
A2	Limited combustibility
B	0
C	1
D	3
E	4
F	Unclassifiable or no performance determined

## Subsection E12 - External Facades

### Clause E12.1

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External facades should be tested in accordance with the following applicable standards:

- (a) BS EN 1364-3:2006, *Fire resistance tests for non-loadbearing elements. Curtain walling. Full configuration (complete assembly)*;
- (b) BS EN 1364-4:2007, *Fire resistance tests for non-loadbearing elements. Curtain walling. Part configuration*.

#### **Commentary**

There are other options for testing of facades, including:

- (a) Large scale testing:
  - (i) NFPA285:2006, *Standard fire test method for evaluation of fire propagation characteristics of exterior non-loadbearing wall assemblies containing combustible components*;
  - (ii) ULC-S134-92, *Fire test of exterior wall assemblies (Vertical channel test)*.
- (b) Small scale testing:
  - (i) ULC-S134-92, *Fire test of exterior wall assemblies (Vertical channel test)*;
  - (ii) AS 1530.1:1994, *Methods for fire tests on building materials, components and structures Part 1: combustibility test for materials*.

## Subsection E13 – Linings of Internal Wall and Ceiling and Decorative Finishes

### Clause E13.1

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Linings of internal wall and ceiling and decorative finishes in the following Use Classifications should comply with the following when tested in accordance with BS EN 13501-1:2007:

- (a) All Use Classifications – within protected exits, Classification C of Table E1;
- (b) Use Classification 3 – general accommodations (including corridors, circulation spaces and rooms) that are not forming the protected exit, Classification B or above of Table E1;
- (c) Use Classification 5a – within cinemas, auditoria and theatres, Classification C or above of Table E1;

When tested in accordance with the British Standards, the performance should meet the equivalent European classification in Table E1.

### Clause E13.2

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For compliance with Clause E13.1, the linings and finishes should be tested in accordance with the following applicable standards:

- (a) BS EN ISO 1182:2010, *Reaction to fire tests for products. Non-combustibility test*;
- (b) BS EN ISO 1716:2010, *Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value)*;
- (c) BS EN 13823:2010, *Reaction to fire tests for building products. Building products excluding floorings exposed to the thermal attack by a single burning item*;
- (d) BS EN ISO 11925-2:2010, *Reaction to fire tests. Ignitability of building products subjected to direct impingement of flame. Single-flame source test*.

### Clause E13.3

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The following British Standards will still be applicable until they are obsolete:

- (a) BS 476-4:1970, *Fire tests on building materials and structures. Part 4: Non-combustibility test for materials*.
- (b) BS 476 Part 6:1989, *Fire tests on building materials and structures - Method of test for fire propagation for products*;
- (c) BS 476 Part 7:1997, *Fire tests on building materials and structures - Method of test to determine the classification of the surface spread of flame of products*.

#### **Commentary**

Decorative finishes are materials that are fixed to walls and ceilings. For cinemas and theatres only, decorative finishes also include seat linings.

There is another option for testing of linings: NFPA 265: 2011, *Standard methods of fire tests for evaluating room fire growth contribution of textile coverings on full height panels and walls*.

## Subsection E14 - Linings and Coverings of Floors

### Clause E14.1

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Linings and coverings of floors should comply with the following when tested in accordance with BS EN 13501-1:2007:

- (a) All Use Classifications – within protected exits, Classification C of Table E1;
- (b) Use Classification 3 – general accommodation (including corridors, circulation spaces and rooms) that are not forming the protected exit, Classification B or above of Table E1;
- (c) Use Classification 5a – within cinemas, auditoria and theatres, Classification C or above of Table E1.

When tested in accordance with the British Standards, the performance should meet the equivalent European classification in Table E1.

### Clause E14.2

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For compliance with Clause E14.1, the linings and coverings of floors should be tested in accordance with the following applicable standards:

- (a) BS EN ISO 1182:2010, *Reaction to fire tests for products. Non-combustibility test*;
- (b) BS EN ISO 1716:2010, *Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value)*;
- (c) BS EN ISO 9239-1:2010, *Reaction to fire tests for floorings. Determination of the burning behaviour using a radiant heat source*;
- (d) BS EN ISO 11925-2:2010, *Reaction to fire tests. Ignitability of building products subjected to direct impingement of flame. Single-flame source test*.

### Clause E14.3

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Other small scale tests may also be applicable:

- (a) BS 4790:1987, *Determination of the effects of a small source of ignition on textile floor coverings (hot metal nut method)*;
- (b) BS 6307:1982, ISO 6925-1982, *Method for determination of the effects of a small source of ignition on textile floor coverings (methenamine tablet test)*.

#### **Commentary**

Whilst a floor is not usually the prime vehicle for fire spread, the contribution of floor coverings such as carpets to fire spread can be significant. The Flooring Radiant Panel represents the exposure of a carpet or other floor covering to a nearby fire, and measures the propensity of the floor covering to be an agent of flame spread over flat floors (in the absence of significant air flow). The Hot Nut Test (BS 4790) and the Methenamine Pill Test (BS 6307, ISO 6925) represent small ignition sources falling on a carpet in the absence of any external radiation.

## Subsection E15 - Acoustic and Thermal Insulation

### Clause E15.1

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Acoustic and thermal insulation in ductings and concealed locations should be tested in accordance with the following applicable standards:

- (a) BS EN ISO 1182:2010, *Reaction to fire tests for products. Non-combustibility test*,
- (b) BS EN ISO 1716:2010, *Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value)*;
- (c) BS EN 13823:2010, *Reaction to fire tests for building products. Building products excluding flooring exposed to the thermal attack by a single burning item*;
- (d) EN ISO 11925-2:2010, *Reaction to fire tests. Ignitability of building products subjected to direct impingement of flame. Single-flame source test*;
- (e) BS EN 13501-1:2007, *Fire classification of construction products and building elements. Classification using data from reaction to fire tests*.

### Clause E15.2

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The following British Standards will still be applicable until they are obsolete:

- (a) BS 476-4:1970, *Fire tests on building materials and structures. Part 4: Non-combustibility test for materials*;
- (b) BS 476 Part 6:1989, *Fire tests on building materials and structures. Method of test for fire propagation for products*;
- (c) BS 476 Part 7:1997, *Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products*.