

English Version

**Fire classification of construction products and building elements  
- Part 1: Classification using data from reaction to fire tests**

Classification des produits et éléments de construction -  
Partie 1: Classement à partir des données d'essais de  
réaction au feu

Klassifizierung von Bauprodukten und Bauarten zu ihrem  
Brandverhalten - Teil 1: Klassifizierung mit den  
Ergebnissen aus den Prüfungen zum Brandverhalten von  
Bauprodukten

This European Standard was approved by CEN on 27 November 2006.

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<b>Contents</b>	<b>Page</b>
Foreword.....	5
Introduction .....	6
<b>1 Scope.....</b>	<b>7</b>
<b>2 Normative references .....</b>	<b>7</b>
<b>3 Terms, definitions and symbols .....</b>	<b>7</b>
<b>3.1 Terms and definitions.....</b>	<b>7</b>
<b>3.2 Symbols and abbreviations .....</b>	<b>11</b>
<b>4 Classes of reaction to fire performance .....</b>	<b>12</b>
<b>5 Test methods.....</b>	<b>12</b>
<b>5.1 General.....</b>	<b>12</b>
<b>5.2 Non-combustibility test (EN ISO 1182) .....</b>	<b>13</b>
<b>5.3 Heat of combustion test (EN ISO 1716) .....</b>	<b>13</b>
<b>5.4 Single burning item test (EN 13823).....</b>	<b>13</b>
<b>5.5 Ignitability test (EN ISO 11925-2).....</b>	<b>13</b>
<b>5.6 Determination of the burning behaviour of floorings, using a radiant heat source (EN ISO 9239-1) .....</b>	<b>13</b>
<b>6 Principles for testing and specimen preparation .....</b>	<b>13</b>
<b>6.1 General requirements for specimen preparation .....</b>	<b>13</b>
<b>6.2 Specific requirements for non-combustibility and heat of combustion testing.....</b>	<b>13</b>
<b>6.3 Specific requirements for the single burning item test, the ignitability test and the test for the determination of the burning behaviour of floorings, using a radiant heat source .....</b>	<b>14</b>
<b>7 Number of tests for classification .....</b>	<b>15</b>
<b>8 Testing of construction products, excluding floorings (see Table 1) .....</b>	<b>16</b>
<b>8.1 Class E .....</b>	<b>16</b>
<b>8.2 Classes D, C, B.....</b>	<b>16</b>
<b>8.3 Classes A2, A1 .....</b>	<b>16</b>
<b>8.3.1 Homogenous products.....</b>	<b>16</b>
<b>8.3.2 Non-homogeneous products.....</b>	<b>16</b>
<b>8.3.3 Class A2 products.....</b>	<b>16</b>
<b>8.4 Additional classifications s1, s2, s3 for smoke production .....</b>	<b>16</b>
<b>8.5 Additional classifications d0, d1, d2 for flaming droplets/particles .....</b>	<b>16</b>
<b>9 Testing of floorings (see Table 2).....</b>	<b>17</b>
<b>9.1 Class E<sub>f</sub>.....</b>	<b>17</b>
<b>9.2 Classes D<sub>f</sub>, C<sub>f</sub>, B<sub>f</sub> .....</b>	<b>17</b>
<b>9.3 Classes A2<sub>f</sub>, A1<sub>f</sub>.....</b>	<b>17</b>
<b>9.3.1 Homogeneous products.....</b>	<b>17</b>
<b>9.3.2 Non-homogeneous products.....</b>	<b>17</b>
<b>9.3.3 Class A2<sub>f</sub> products .....</b>	<b>17</b>
<b>9.4 Additional classifications s1, s2 for smoke production .....</b>	<b>17</b>
<b>10 Testing of linear pipe thermal insulation products (see Table 3) .....</b>	<b>17</b>
<b>10.1 Class E<sub>L</sub>.....</b>	<b>17</b>
<b>10.2 Classes D<sub>L</sub>, C<sub>L</sub>, B<sub>L</sub>.....</b>	<b>17</b>
<b>10.3 Classes A2<sub>L</sub>, A1<sub>L</sub>.....</b>	<b>18</b>
<b>10.3.1 Homogenous products.....</b>	<b>18</b>
<b>10.3.2 Non-homogeneous products.....</b>	<b>18</b>

10.3.3	Class A <sub>2L</sub> products .....	18
10.4	Additional classifications s <sub>1</sub> , s <sub>2</sub> , s <sub>3</sub> for smoke production .....	18
10.5	Additional classifications d <sub>0</sub> , d <sub>1</sub> , d <sub>2</sub> for flaming droplets/particles .....	18
11	Classification criteria for construction products, excluding floorings (see Table 1) .....	18
11.1	General .....	18
11.2	Class F .....	19
11.3	Class E .....	19
11.4	Class D .....	19
11.5	Class C .....	19
11.6	Class B .....	20
11.7	Class A <sub>2</sub> .....	20
11.7.1	General .....	20
11.7.2	Homogeneous products .....	20
11.7.3	Non-homogeneous products .....	20
11.8	Class A <sub>1</sub> .....	21
11.8.1	Homogeneous products .....	21
11.8.2	Non-homogeneous products .....	22
11.9	Additional classifications s <sub>1</sub> , s <sub>2</sub> , s <sub>3</sub> for smoke production .....	23
11.9.1	General .....	23
11.9.2	s <sub>1</sub> .....	23
11.9.3	s <sub>2</sub> .....	23
11.9.4	s <sub>3</sub> .....	23
11.10	Additional classifications d <sub>0</sub> , d <sub>1</sub> , d <sub>2</sub> for flaming droplets and/or particles .....	23
11.10.1	Products classified A <sub>2</sub> , B, C, D .....	23
11.10.2	Products classified E .....	23
12	Classification criteria for floorings (see Table 2) .....	24
12.1	General .....	24
12.2	Class F <sub>fl</sub> .....	24
12.3	Class E <sub>fl</sub> .....	24
12.4	Class D <sub>fl</sub> .....	24
12.5	Class C <sub>fl</sub> .....	25
12.6	Class B <sub>fl</sub> .....	25
12.7	Class A <sub>2fl</sub> .....	25
12.7.1	General .....	25
12.7.2	Homogeneous products .....	25
12.7.3	Non-homogeneous products .....	26
12.8	Class A <sub>1fl</sub> .....	26
12.8.1	Homogeneous products .....	26
12.8.2	Non-homogeneous products .....	27
12.9	Additional classifications s <sub>1</sub> , s <sub>2</sub> for smoke production .....	27
12.9.1	General .....	27
12.9.2	s <sub>1</sub> .....	27
12.9.3	s <sub>2</sub> .....	27
13	Classification criteria for linear pipe thermal insulation products (see Table 3) .....	28
13.1	General .....	28
13.2	Class F <sub>L</sub> .....	28
13.3	Class E <sub>L</sub> .....	28
13.4	Class D <sub>L</sub> .....	28
13.5	Class C <sub>L</sub> .....	29
13.6	Class B <sub>L</sub> .....	29
13.7	Class A <sub>2L</sub> .....	29
13.7.1	General .....	29
13.7.2	Homogeneous products .....	29
13.7.3	Non-homogeneous products .....	30
13.8	Class A <sub>1L</sub> .....	31
13.8.1	Homogeneous products .....	31
13.8.2	Non-homogeneous products .....	31
13.9	Additional classifications s <sub>1</sub> , s <sub>2</sub> , s <sub>3</sub> for smoke production .....	32

13.9.1	General	32
13.9.2	s1	32
13.9.3	s2	32
13.9.4	s3	32
13.10	Additional classifications d0, d1, d2 for flaming droplets and/or particles	32
13.10.1	Products classified A <sub>2L</sub> , B <sub>L</sub> , C <sub>L</sub> , D <sub>L</sub>	32
13.10.2	Products classified E <sub>L</sub>	33
14	Presentation of classification	33
14.1	Construction products, excluding floorings and linear pipe thermal insulation products	33
14.2	Floorings	34
14.3	Linear pipe thermal insulation products	34
15	Field of application of the classification	35
16	Classification report	35
16.1	General	35
16.2	Content and format	35
<b>Annex A (informative) Background information for the application of the Commission Decision of 8 February 2000 implementing Council Directive 89/106/EEC as regards the classification of the reaction to fire performance of construction products</b>		
		40
A.1	General	40
A.2	Assumptions	40
A.3	Reference fire situations	41
A.4	Relationship between classes and reference fire situations	43
<b>Annex B (normative) Reaction to fire classification report</b>		
		47
<b>Bibliography</b>		
		52

## Foreword

This document (EN 13501-1:2007) has been prepared by Technical Committee CEN/TC 127 "Fire safety in buildings", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2007, and conflicting national standards shall be withdrawn at the latest by August 2007.

This document supersedes EN13501-1:2002.

In addition to editorial corrections this document includes the reaction to fire classification procedure for linear pipe thermal insulation products.

CEN, CENELEC and EOTA committees preparing technical specifications, which contain performance requirements against reaction to fire tests, should make reference to the reaction to fire classification given in this European Standard and not refer directly to any specific fire test method.

EN 13501 *Fire classification of construction products and building elements* consists of the following parts:

Part 1: *Classification using data from reaction to fire tests*

Part 2: *Classification using data from fire resistance tests, excluding ventilation services*

Part 3: *Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers*

Part 4: *Classification using data from fire resistance tests on components of smoke control systems*

Part 5: *Classification using data from external fire exposure to roofs tests*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## Introduction

The aim of this European Standard is to define a harmonized procedure for the classification of reaction to fire of construction products. This classification is based on the test procedures listed in Clause 5.

This European Standard has been prepared in support of the second essential requirement in the EC Construction Products Directive (89/106/EEC) and as detailed in the Interpretative Document Number 2: Safety in case of fire (OJ C62 Vol. 37).

Background information on the Commission Decision regarding the classification of the reaction to fire performance of construction products is given in Annex A.

The European Commission has drawn up a list of products which, under specified conditions, can be considered to be class A1 without testing. This information is given in the Commission Decision 96/603/EC (OJ L 267 19.10.1966 p23) as amended by 2000/605/EC (OJ L 258 12.10.2000 p36) and 2003/424/EC (OJ L 144 12.6.2003 p9).

Additionally there is a procedure by which certain products can be assigned a particular fire classification without the need for testing. Such products have well established reaction to fire performance and have been agreed by the Standing Committee on Construction. Agreements relating to such products which may be 'classified without further testing' (CWFT) are published in the Official Journal of the EC and are listed on the Nando-CPD database on the EC website (<http://europa.eu.int/comm/enterprise/construction>).

Parts 2, 3 and 4 of this European Standard are concerned with classification resulting from fire resistance tests. Part 5 covers classification resulting from tests for external fire exposure to roofs.

**NOTE** If the classification based on the tests and criteria given in Tables 1 and 2 is not appropriate, one or more reference scenarios (representative scale tests typifying agreed hazard scenarios) can be called upon within the context of a defined procedure. This procedure is intended to be the subject of a future European Standard or Commission Decision, on the basis of an agreement between the Commission and the Member States, in consultation with CEN/CENELEC and EOTA.

## 1 Scope

This European Standard provides the reaction to fire classification procedure for all construction products, including products incorporated within building elements.

Products are considered in relation to their end use application.

This document applies to three categories, which are treated separately in this European Standard:

- construction products, excluding floorings and linear pipe thermal insulation products;
- floorings;
- linear pipe thermal insulation products.

**NOTE** The treatment of some families of products is still under review and can necessitate amendments to this European Standard (see European Commission Decision 2000/147/EC).

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13823, *Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item*

EN ISO 1182, *Reaction to fire tests for building products — Non-combustibility test (ISO 1182:2002)*

EN ISO 1716, *Reaction to fire tests for building products — Determination of the heat of combustion (ISO 1716:2002)*

EN ISO 9239-1, *Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source (ISO 9239-1:2002)*

EN ISO 11925-2, *Reaction to fire tests — Ignitability of building products subjected to direct impingement of flame — Part 2: Single-flame source test (ISO 11925-2:2002)*

## 3 Terms, definitions and symbols

### 3.1 Terms and definitions

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

**NOTE** Where the definitions are identical to those in EN ISO 13943, this is indicated.



### 3.1.1

#### **product**

material, element or component about which information is required

### 3.1.2

#### **material**

single basic substance or uniformly dispersed mixture of substances, e.g. metal, stone, timber, concrete, mineral wool with uniformly dispersed binder or polymers

### 3.1.3

#### **homogeneous product**

product consisting of a single material, having uniform density and composition throughout the product

### 3.1.4

#### **non-homogeneous product**

product that does not satisfy the requirements of a homogeneous product.

**NOTE** It is a product composed of one or more components, substantial and/or non-substantial

### 3.1.5

#### **substantial component**

material that constitutes a significant part of a non-homogeneous product. A layer with a mass/unit area  $\geq 1,0 \text{ kg/m}^2$  or a thickness  $\geq 1,0 \text{ mm}$  is considered to be a substantial component

### 3.1.6

#### **non-substantial component**

material that does not constitute a significant part of a non-homogeneous product. A layer with a mass/unit area  $< 1,0 \text{ kg/m}^2$  and a thickness  $< 1,0 \text{ mm}$  is considered to be a non-substantial component

**NOTE** Two or more non-substantial layers that are adjacent to each other (i.e. with no substantial component(s) in between the layers) are regarded as one non-substantial component when they collectively comply with the requirements for a layer being a non-substantial component.

### 3.1.7

#### **internal non-substantial component**

non-substantial component that is covered on both sides by at least one substantial component

### 3.1.8

#### **external non-substantial component**

non-substantial component that is not covered on one side by a substantial component

### 3.1.9

#### **flooring**

upper layer(s) of a floor, comprising any surface finish with or without an attached backing and with any accompanying underlay, interlayer and adhesives

### 3.1.10

#### **linear pipe thermal insulation product**

length of insulation product designed to fit around pipes, with a maximum outer insulation diameter of 300 mm and not intended for use with cylindrical ducts

### 3.1.11

#### **substrate**

product which is used immediately beneath the product about which information is required.

**NOTE** For flooring, it is the floor on which it is mounted or the material which represents this floor

### **3.1.12**

#### **standard substrate**

product which is representative of the substrate used in end-use applications

### **3.1.13**

#### **end use application**

real application of a product, in relation to all aspects that influence the behaviour of that product under different fire situations.

NOTE It covers aspects such as its quantity, orientation, position in relation to other adjacent products, and its method of fixing

### **3.1.14**

#### **fire performance**

response of an item when exposed to a specific fire (EN ISO 13943)

### **3.1.15**

#### **reaction to fire**

response of a product in contributing by its own decomposition to a fire to which it is exposed, under specified conditions

### **3.1.16**

#### **fire scenario**

detailed description of conditions, including environmental, of one or more stages from before ignition to after completion of combustion at a specific location or in a real scale simulation (EN ISO 13943)

### **3.1.17**

#### **reference scenario**

hazard situation used as a reference for a given test method or classification system

### **3.1.18**

#### **fire situation**

stage in the development of a fire, characterised by the nature, severity and size of the thermal attack on the products involved

### **3.1.19**

#### **combustion**

exothermic reaction of a substance with an oxidizer (EN ISO 13943)

NOTE Combustion generally emits effluent accompanied by flames and/or visible light.

### **3.1.20**

#### **heat of combustion**

thermal energy produced by combustion of unit of mass of a given substance (EN ISO 13943)

NOTE It is expressed in joules per kilogram.

### **3.1.21**

#### **gross heat of combustion (PCS)**

heat of combustion of a substance when the combustion is complete and any produced water is entirely condensed under specified conditions (EN ISO 13943)

### **3.1.22**

#### **net heat of combustion (PCI)**

heat of combustion of a substance when the combustion is complete and any produced water is in the vapour state under specified conditions (EN ISO 13943)

NOTE The net heat of combustion may be calculated from the gross heat of combustion.

### 3.1.23

#### **contribution to fire**

energy released by a product influencing the fire growth both in pre- and post-flashover situations

### 3.1.24

#### **ignitability**

measure of the ease with which an item can be ignited, under specified conditions (EN ISO 13943)

### 3.1.25

#### **heat release**

calorific energy which is released by the combustion of an item under specified conditions (EN ISO 13943)

### 3.1.26

#### **small fire attack**

thermal attack produced by a small flame like a match or a lighter

### 3.1.27

#### **level of exposure**

intensity, duration and extent of the thermal attack on a product

### 3.1.28

#### **flame spread**

vertical flame spread ( $F_v$ ) is the highest point reached by the flame tip, as measured in the test in EN ISO 11925-2

NOTE Lateral flame spread is the furthest extent of travel of a sustained flame, as measured in the EN 13823 test.

### 3.1.29

#### **sustained flaming**

existence of flame on or over a surface for a minimum period of time (EN ISO 13943)

NOTE The period of time required will vary across different standards, but it is usually of the order of 10 s.

### 3.1.30

#### **fully developed fire**

state of total involvement of combustible materials in a fire (EN ISO 13943)

### 3.1.31

#### **flashover**

transition to a state of total surface involvement in a fire of combustible materials within an enclosure (EN ISO 13943)

### 3.1.32

#### **flaming droplets/particles**

material separating from the specimen during the fire test and continuing to flame for a minimum period as described by the test method

### 3.1.33

#### **critical heat flux at extinguishment (CHF)**

incident heat flux ( $\text{kW/m}^2$ ) at the surface of a specimen at the point where the flame ceases to advance and may subsequently go out.

NOTE The heat flux value reported is based on interpolations of measurements with a non-combustible calibration board

### 3.1.34

#### **heat flux at X minutes (HF-X)**

total heat flux ( $\text{kW/m}^2$ ) received by the specimen at the most distant spread of flame position observed during the first X minutes of the test

### 3.1.35

#### **critical heat flux (CHF)**

heat flux at which the flame extinguishes (CHF) or the heat flux after a test period of 30 min (HF-30), whichever is the lower value

NOTE It is the flux corresponding with the furthest extent of spread of flame within 30 min.

### 3.1.36

#### **smoke hazard**

potential for injury and/or damage from smoke

### 3.1.37

#### **FIGRA**

fire growth rate index used for classification purposes

EXAMPLE:

For the classes A2 and B,  $FIGRA = FIGRA_{0,2MJ}$

For the classes C and D,  $FIGRA = FIGRA_{0,4MJ}$

For the classes A2L, BL, and CL,  $FIGRA = FIGRA_{0,2MJ}$

For the class DL,  $FIGRA = FIGRA_{0,4MJ}$

### 3.1.38

#### **$FIGRA_{0,2MJ}$**

maximum of the quotient of heat release rate from the specimen and the time of its occurrence using a THR-threshold of 0,2 MJ

NOTE  $FIGRA_{0,2MJ}$  is defined in more detail in EN 13823.

### 3.1.39

#### **$FIGRA_{0,4MJ}$**

maximum of the quotient of heat release rate from the specimen and the time of its occurrence using a THR threshold of 0,4 MJ

NOTE The  $FIGRA_{0,4MJ}$  is defined in more detail in EN 13823.

### 3.1.40

#### **SMOGRA**

smoke growth rate. The maximum of the quotient of smoke production rate from the specimen and the time of its occurrence

NOTE The SMOGRA is defined in more detail in EN 13823.

## 3.2 Symbols and abbreviations

The symbols and notations correspond to those given in the appropriate test method.

$\Delta T$  temperature rise [K]

$\Delta m$  mass loss [%]

$F_s$	flame spread [mm]
<i>FIGRA</i>	fire growth rate index used for classification purposes
<i>FIGRA</i> <sub>0,2MJ</sub>	fire growth rate index at <i>THR</i> threshold of 0,2 MJ
<i>FIGRA</i> <sub>0,4MJ</sub>	fire growth rate index at <i>THR</i> threshold of 0,4 MJ
<i>LFS</i>	lateral flame spread [m]
<i>PCS</i>	gross calorific potential [MJ/kg or MJ/m <sup>2</sup> ]
<i>PCI</i>	net calorific potential [MJ/kg or MJ/m <sup>2</sup> ]
<i>SMOGRA</i>	smoke growth rate
$t_f$	duration of sustained flaming [s]
<i>THR</i> <sub>600s</sub>	total heat release within 600 s [MJ]
<i>TSP</i> <sub>600s</sub>	total smoke production within 600 s [m <sup>2</sup> ]
$m'$	mean value of the set of results of a continuous parameter determined in accordance with the relevant test method using the minimum number of tests as specified in the test method
$m$	mean value of the set of results of a continuous parameter determined in accordance with the procedure in 7.3 and used for classification

## 4 Classes of reaction to fire performance

The classes with their corresponding fire performance are given in:

- Table 1 for construction products excluding floorings;
- Table 2 for floorings;
- Table 3 for linear pipe thermal insulation products.

Products classified in a given class are deemed to satisfy all the requirements of any lower class.

Pipe-insulation and insulation of cylindrical ducts with a maximum outer insulation diameter larger than 300 mm and insulation product intended to be used on flat surfaces shall be tested as prescribed in Table 1.

A classification can only be obtained by undertaking the tests required for that particular product. A classification obtained for one product type, e.g. floorings, cannot be interpreted or accepted in a different classification system.

## 5 Test methods

### 5.1 General

The following test methods are specified in relation to the envisaged reaction to fire classification. The relevant classification parameters are given in Tables 1, 2 and 3.

## 5.2 Non-combustibility test (EN ISO 1182)

This test identifies products that will not, or not significantly, contribute to a fire, regardless of their end use.

The test is relevant for the classes A1, A2, A1<sub>fl</sub>, A2<sub>fl</sub>, A1<sub>L</sub> and A2<sub>L</sub>.

## 5.3 Heat of combustion test (EN ISO 1716)

This test determines the potential maximum total heat release of a product when completely burning, regardless of its end use.

The test is relevant for the classes A1, A2, A1<sub>fl</sub>, A2<sub>fl</sub>, A1<sub>L</sub> and A2<sub>L</sub>.

It allows the determination of both the gross heat of combustion (*PCS*) and the net heat of combustion (*PCI*).

## 5.4 Single burning item test (EN 13823)

This test evaluates the potential contribution of a product to the development of a fire, under a fire situation simulating a single burning item in a room corner near to that product. The test is relevant for the classes A2, A2<sub>L</sub>, B, B<sub>L</sub>, C, C<sub>L</sub>, D and D<sub>L</sub>. Under the conditions specified in 8.3.2 the test is also relevant for the class A1.

## 5.5 Ignitability test (EN ISO 11925-2)

This test evaluates the ignitability of a product under exposure to a small flame. The test is relevant for the classes B, C, D, E, B<sub>fl</sub>, C<sub>fl</sub>, D<sub>fl</sub>, E<sub>fl</sub>, B<sub>L</sub>, C<sub>L</sub>, D<sub>L</sub> and E<sub>L</sub>.

## 5.6 Determination of the burning behaviour of floorings, using a radiant heat source (EN ISO 9239-1)

This test evaluates the critical radiant flux below which flames no longer spread over a horizontal surface.

The test is relevant for the classes A2<sub>fl</sub>, B<sub>fl</sub>, C<sub>fl</sub> and D<sub>fl</sub>.

# 6 Principles for testing and specimen preparation

## 6.1 General requirements for specimen preparation

Before testing, product specimens shall be prepared and conditioned and, where relevant, mounted in accordance with the relevant test methods, product specifications or other technical specifications. Ageing and washing procedures, if required by the relevant product specifications, are carried out in accordance with that specification.

## 6.2 Specific requirements for non-combustibility and heat of combustion testing

Non-combustibility and heat of combustion are product characteristics and are thus independent of the end use of the product.

For homogeneous products they are determined directly.

Non-combustibility and heat of combustion of non-homogeneous products are determined indirectly by prescriptive rules, from the data obtained on their substantial and non-substantial components.

### 6.3 Specific requirements for the single burning item test, the ignitability test and the test for the determination of the burning behaviour of floorings, using a radiant heat source

The potential contribution of a product to a fire does not only depend on its intrinsic properties and the thermal attack, but also to a large extent on its end use application in the construction. Therefore, it shall be tested so as to simulate its end use application.

NOTE It should be noted that as a consequence of a product being used in different end use applications, the product can have different classifications relating to each application.

This end use application mainly includes the following aspects:

- the orientation of the product;
- its position in relation to other adjacent products (substrate, fixing etc.).

Typical orientations are:

- vertical, facing an open space (wall/facade position);
- vertical, facing a void;
- horizontal with exposed face downwards (ceiling position);
- horizontal with exposed face upwards (flooring position);
- horizontal within a void.

All construction products, except floorings, shall be tested in the vertical position for the purpose of reaction to fire classification.

Floorings shall be tested horizontally with the exposed face upwards according to EN ISO 9239-1, and vertically according to EN ISO 11925-2.

Typical positions in relation to other products are for example:

- free standing: without any product immediately behind or in front of it. In this case the product shall be tested free standing with an appropriate support;
- on a substrate: glued, mechanically fastened or simply in contact. In this case the product shall be tested with a substrate and fastening representing the end use application;
- forming a cavity with a substrate. The product shall be tested as such.

Details of test arrangements are given in the relevant test method.

Taking into account the role of the substrates and the fixings on the potential contribution of a product to a fire, a single product may be classified in different classes as a function of its end use application. If only one end use is envisaged, only that end use shall be tested.

Products which, in practice, are positioned in vertical or horizontal voids, are tested with an air gap. For such applications, asymmetrical products may be tested and classified for each side separately.

In order to reduce the amount of testing, a series of standard substrates is given in EN 13238 and a set of representative mounting conditions is given in the relevant test method or product specification. A sponsor, however, may choose none of the standard substrates or the representative mounting conditions, although this will limit the field of application of the test results and classifications obtained.

In the ignitability test (EN ISO 11925-2), products are tested with surface flame attack only if in the envisaged end use application direct flame attack on the edge cannot occur. This is the case for floorings. If edges can be exposed under end use conditions, both surface and edge flame attacks are applied.

## 7 Number of tests for classification

7.1 The minimum number of tests is given in the appropriate test method.

7.2 For a product to claim a particular classification all the relevant criteria, given in Table 1, 2 or 3, shall comply with the stated requirements.

7.3 For each continuous parameter ( $\Delta T$ ,  $\Delta m$ ,  $t_f$ ,  $PCS$ ,  $PCI$ ,  $FIGRA_{0,2MJ}$ ,  $FIGRA_{0,4MJ}$ ,  $THR_{600s}$ ,  $SMOGRA$ ,  $TSP_{600s}$ , critical heat flux) the selection of the class is based on the mean value ( $m$ ) of the set of results of this parameter, determined in accordance with the relevant test method, using the following procedure:

- a) calculate the mean value ( $m'$ ) of the set of results for this parameter using the minimum number of tests;
- b) if  $m'$  lies within the limits for an envisaged class, the value  $m$  used for classification is  $m'$ ;
- c) if  $m'$  does not lie within the limits for an envisaged class, two additional tests may be carried out;
- d) if two additional tests are carried out, the results for each parameter in these two tests shall be added to the set of results obtained in the minimum number of tests. Next, the two extremes (highest and lowest) for each parameter individually shall be excluded. The value  $m$ , used for classification, shall then be calculated using the remaining set of results for each parameter.

7.4 For the compliance parameters  $LFS$ ,  $F_g$  and flaming droplets/particles, the selection of the class is based on the presence of a non-compliance in the set of results of this parameter, determined in accordance with the relevant test method, using the following procedure:

- If the set of results for this parameter does not contain a non-compliance, the result "compliant" shall be used for classification.  
If the set of results for this parameter contains more than one non-compliance, the result "non-compliant" shall be used for classification.  
If the set of results for this parameter contains only one non-compliant result, two additional tests may be carried out.
- If the two additional tests are not carried out, then the result "non-compliant" shall be used for classification.  
If the two additional tests are carried out, and a further "non-compliant" is recorded, the result "non-compliant" shall be used for classification. If no further non-compliance results are recorded, then a result "compliant" shall be used for classification.

7.5 The number of tests used for classification of a product is equal to the minimum number of tests given in the appropriate test method increased by two. The two additional tests may be used only under the conditions given in 7.3 c), 7.3 d), 7.4, first and second hyphen.



## 8 Testing of construction products, excluding floorings (see Table 1)

### 8.1 Class E

A product applying for class E shall be tested in accordance with EN ISO 11925-2 with 15 s exposure time.

### 8.2 Classes D, C, B

A product applying for class D, C or B shall be tested in accordance with EN ISO 11925-2 with 30 s exposure time.

Products satisfying the EN ISO 11925-2 criteria for class D, C or B shall additionally be tested in accordance with EN 13823.

$FIGRA_{0,2MJ}$  shall first be used to determine whether the requirement for Class A2 or B is met and if it is not,  $FIGRA_{0,4MJ}$  shall be used to determine whether Class C or D is met.

### 8.3 Classes A2, A1

#### 8.3.1 Homogenous products

A product applying for class A1 shall be tested in accordance with EN ISO 1182 and EN ISO 1716.

A product applying for class A2 shall be tested in accordance with either EN ISO 1182 or EN ISO 1716.

#### 8.3.2 Non-homogeneous products

Each substantial component of a non-homogeneous product applying for class A1 shall be tested separately in accordance with EN ISO 1182 and EN ISO 1716. Additionally, any product with an external non-substantial component, having a  $PCS > 2,0$  MJ/kg and a  $PCS \leq 2,0$  MJ/m<sup>2</sup>, shall be tested in accordance with EN 13823 (see Table 1 – footnote c – FIGRA in this case means  $FIGRA_{0,2MJ}$ ).

Each substantial component of a non-homogeneous product applying for class A2 shall be tested separately in accordance with either EN ISO 1182 or EN ISO 1716. The non-substantial components of a non-homogeneous product shall be tested separately in accordance with EN ISO 1716 only.

#### 8.3.3 Class A2 products

Additionally, all products applying for class A2 shall be tested in accordance with EN 13823.

### 8.4 Additional classifications s1, s2, s3 for smoke production

Classifications s1, s2 and s3 are deduced from the measuring data obtained from testing in accordance with EN 13823.

### 8.5 Additional classifications d0, d1, d2 for flaming droplets/particles

Classifications d0, d1 and d2 are deduced from observations of flaming droplets and particles:

- for class E in EN ISO 11925-2 (d2);
- for classes B, C and D in EN ISO 11925-2 and EN 13823 (d0, d1 or d2);
- for class A2 (and under the conditions specified in 8.3.2) in EN 13823 (d0, d1 or d2).

## **9 Testing of floorings (see Table 2)**

### **9.1 Class E<sub>f</sub>**

A product applying for class E<sub>f</sub> shall be tested in accordance with EN ISO 11925-2 with 15 s exposure time.

### **9.2 Classes D<sub>f</sub>, C<sub>f</sub>, B<sub>f</sub>**

A product applying for one of the classes D<sub>f</sub>, C<sub>f</sub> or B<sub>f</sub> shall be tested in accordance with EN ISO 9239-1 and EN ISO 11925-2 with 15 s exposure time.

### **9.3 Classes A2<sub>f</sub>, A1<sub>f</sub>**

#### **9.3.1 Homogeneous products**

A product applying for class A1<sub>f</sub> shall be tested in accordance with EN ISO 1182 and EN ISO 1716.

A product applying for class A2<sub>f</sub> shall be tested in accordance with EN ISO 9239-1, and either EN ISO 1182 or EN ISO 1716.

#### **9.3.2 Non-homogeneous products**

Each substantial component of a non-homogeneous product applying for class A1<sub>f</sub> shall be tested separately in accordance with EN ISO 1182 and EN ISO 1716.

Each substantial component of a non-homogeneous product applying for class A2<sub>f</sub> shall be tested separately in accordance with either EN ISO 1182 or EN ISO 1716. The non-substantial components of a non-homogeneous product shall be tested separately in accordance with EN ISO 1716 only.

#### **9.3.3 Class A2<sub>f</sub> products**

Additionally, all products applying for class A2<sub>f</sub> shall be tested in accordance with EN ISO 9239-1.

## **9.4 Additional classifications s1, s2 for smoke production**

Classifications s1 and s2 are deduced from the data obtained from testing in accordance with EN ISO 9239-1.

## **10 Testing of linear pipe thermal insulation products (see Table 3)**

### **10.1 Class E<sub>L</sub>**

A product applying for class E<sub>L</sub> shall be tested in accordance with EN ISO 11925-2 with 15 s exposure time.

### **10.2 Classes D<sub>L</sub>, C<sub>L</sub>, B<sub>L</sub>**

A product applying for class D<sub>L</sub>, C<sub>L</sub> or B<sub>L</sub> shall be tested in accordance with EN ISO 11925-2 with 30 s exposure time.

Products satisfying the EN ISO 11925-2 criteria for class D<sub>L</sub>, C<sub>L</sub> or B<sub>L</sub> shall additionally be tested in accordance with EN 13823.

$FIGRA_{0,2MJ}$  should first be used to determine whether the requirement for class  $A_{2L}$  or  $B_L$  or  $C_L$  is met and if it is not,  $FIGRA_{0,4MJ}$  should be used to determine whether class  $D_L$  is met.

### 10.3 Classes $A_{2L}$ , $A_{1L}$

#### 10.3.1 Homogenous products

A product applying for class  $A_{1L}$  shall be tested in accordance with EN ISO 1182 and EN ISO 1716.

A product applying for class  $A_{2L}$  shall be tested in accordance with either EN ISO 1182 or EN ISO 1716.

#### 10.3.2 Non-homogeneous products

Each substantial component of a non-homogeneous product applying for class  $A_{1L}$  shall be tested separately in accordance with EN ISO 1182 and EN ISO 1716.

Each substantial component of a non-homogeneous product applying for class  $A_{2L}$  shall be tested separately in accordance with either EN ISO 1182 or EN ISO 1716. The non-substantial components of a non-homogeneous product shall be tested separately in accordance with EN ISO 1716 only.

#### 10.3.3 Class $A_{2L}$ products

Additionally, all products applying for class  $A_{2L}$  shall be tested in accordance with EN 13823.

### 10.4 Additional classifications $s_1$ , $s_2$ , $s_3$ for smoke production

Classifications  $s_1$ ,  $s_2$  and  $s_3$  are deduced from the measuring data obtained from testing in accordance with EN 13823.

### 10.5 Additional classifications $d_0$ , $d_1$ , $d_2$ for flaming droplets/particles

Classifications  $d_0$ ,  $d_1$  and  $d_2$  are deduced from observations of flaming droplets and particles:

- for class  $E_L$  in EN ISO 11925-2 (d2);
- for classes  $B_L$ ,  $C_L$  and  $D_L$  in EN ISO 11925-2 and EN 13823 (d0, d1 or d2);
- for class  $A_{2L}$  in EN 13823 (d0, d1 or d2).

## 11 Classification criteria for construction products, excluding floorings (see Table 1)

### 11.1 General

Performance levels for each specific parameter are determined from the test methods.

#### a) Continuous parameters

EN ISO 1182	$\Delta T$ $\Delta m$ $t_f$
EN ISO 1716	PCS and possibly PCI

EN 13823

$FIGRA_{0,2MJ}$  and  $FIGRA_{0,4MJ}$   
 $THR_{600s}$   
SMOGR  
 $TSP_{600s}$

The mean value ( $m$ ) shall be determined for the performance level for each parameter. The classification shall then be determined from this value as described in 7.3.

b) compliance parameters

EN 13823

$LFS$  and flaming droplets/particles

EN ISO 11925-2

$F_s$  and flaming droplets/particles

The individual results for each parameter shall be assessed to determine the classification as described in 7.4.

### 11.2 Class F

No performance criteria.

Class F also applies if a product fails to obtain class E when tested to EN ISO 11925-2.

### 11.3 Class E

The product shall satisfy the following criteria:

EN ISO 11925-2

Under conditions of surface flame attack and, where required, edge flame attack (see 6.3), with 15 s exposure time, there shall be no flame spread in excess of 150 mm vertically from the point of application of the test flame within 20 s from the time of application.

### 11.4 Class D

The product shall satisfy all of the following criteria:

a) EN ISO 11925-2

Under condition of surface flame attack and, where required, edge flame attack (see 6.3), with 30 s exposure time, there shall be no vertical flame spread in excess of 150 mm from the point of application of the test flame within 60 s from the time of application;

b) EN 13823

$FIGRA (= FIGRA_{0,4MJ}) \leq 750 \text{ W/s}$ .

### 11.5 Class C

The product shall satisfy all of the following criteria:

a) EN ISO 11925-2

Under condition of surface flame attack and, where required, edge flame attack (see 6.3) with 30 s exposure time, there shall be no flame spread in excess of 150 mm vertically from the point of application of the test flame within 60 s from the time of application;

b) EN 13823

No lateral flame spread (*LFS*) to the edge of the specimen.

$$FIGRA (= FIGRA_{0,4MJ}) \leq 250 \text{ W/s}$$

$$THR_{600s} \leq 15 \text{ MJ}$$

### 11.6 Class B

The product shall satisfy all of the following criteria:

a) EN ISO 11925-2

Under condition of surface flame attack and, where required, edge flame attack (see 6.3) with 30 s exposure time, there shall be no flame spread in excess of 150 mm vertically from the point of application of the test flame within 60 s from the time of application;

b) EN 13823

No lateral flame spread (*LFS*) to the edge of the specimen.

$$FIGRA (= FIGRA_{0,2MJ}) \leq 120 \text{ W/s}$$

$$THR_{600s} \leq 7,5 \text{ MJ}$$

### 11.7 Class A2

#### 11.7.1 General

When tested in accordance with EN 13823 every class A2 product shall satisfy the same criteria as for class B (see 11.6).

#### 11.7.2 Homogeneous products

The product shall satisfy the following criteria:

a) EN ISO 1716

$$PCS \leq 3,0 \text{ MJ/kg}$$

or

b) EN ISO 1182

$$\Delta T \leq 50 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f \leq 20 \text{ s.}$$

#### 11.7.3 Non-homogeneous products

Each substantial component shall satisfy the following criteria:

- a) EN ISO 1716

$$PCS \leq 3,0 \text{ MJ/kg}$$

or

- b) EN ISO 1182

$$\Delta T \leq 50 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f \leq 20 \text{ s.}$$

Each external non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 4,0 \text{ MJ/m}^2.$$

Each internal non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 4,0 \text{ MJ/m}^2.$$

The product as a whole shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 3,0 \text{ MJ/kg.}$$

**NOTE** The *PCS* parameter includes a measure of the latent heat contained within any moisture vapour generated by any material during its combustion in the test according to EN ISO 1716:2002, Annex A and which during the fire process may not contribute to temperature rise. Therefore, products containing materials that can be shown to provide a *PCI* (as opposed to a *PCS* value) significantly less than the specified limits for the *PCS* can be considered as candidates for an appeal procedure.

## 11.8 Class A1

### 11.8.1 Homogeneous products

The product shall satisfy all of the following criteria:

- a) EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg}$$

and

- b) EN ISO 1182

$$\Delta T \leq 30 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f = 0 \text{ s.}$$

### 11.8.2 Non-homogeneous products

Each substantial component shall satisfy all of the following criteria:

- a) EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg}$$

and

- b) EN ISO 1182

$$\Delta T \leq 30 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f = 0 \text{ s.}$$

Each external non-substantial component shall satisfy all of the criteria specified in either c) or d):

- c) EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg}$$

or

- d) EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/m}^2$$

and

EN 13823

$$FIGRA (= FIGRA_{0,2MJ}) \leq 20 \text{ W/s and}$$

$LFS < \text{edge of specimen}$  and

$$THR_{600s} \leq 4,0 \text{ MJ and}$$

satisfy the conditions for s1 and d0.

Each internal non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 1,4 \text{ MJ/m}^2.$$

The product as a whole shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg.}$$

NOTE The *PCS* parameter includes a measure of the latent heat contained within any moisture vapour generated by any material during its combustion in the test according to EN ISO 1716:2002, Annex A and which during the fire process may not contribute to temperature rise. Therefore, products containing materials that can

be shown to provide a *PCI* (as opposed to a *PCS* value) significantly less than the specified limits for the *PCS* can be considered as candidates for an appeal procedure.

## **11.9 Additional classifications s1, s2, s3 for smoke production**

### **11.9.1 General**

Products classified A2, B, C, D obtain an additional classification of s1, s2 or s3 regarding the smoke production.

### **11.9.2 s1**

EN 13823

The product shall satisfy all of the following criteria:

$$SMOGRA \leq 30 \text{ m}^2/\text{s}^2 \text{ and}$$

$$TSP_{600s} \leq 50 \text{ m}^2.$$

### **11.9.3 s2**

EN 13823

The product shall satisfy all of the following criteria:

$$SMOGRA \leq 180 \text{ m}^2/\text{s}^2 \text{ and}$$

$$TSP_{600s} \leq 200 \text{ m}^2.$$

### **11.9.4 s3**

Products for which no performance is declared or which do not comply with the s1 and s2 criteria.

## **11.10 Additional classifications d0, d1, d2 for flaming droplets and/or particles**

### **11.10.1 Products classified A2, B, C, D**

Products classified A2, B, C, D obtain an additional classification of d0, d1 or d2 regarding the production of flaming droplets and/or particles as follows:

- d0, if no flaming droplets/particles occur within 600 s when tested in accordance with EN 13823;
- d1, if no flaming droplets/particles, persisting longer than 10 s, occur within 600 s when tested in accordance with EN 13823;
- d2 if no performance is declared, or if the product
  - a) does not comply with the d0 and d1 classification criteria given above or
  - b) ignites the paper in the ignitability test (EN ISO 11925-2).

### **11.10.2 Products classified E**

If ignition of the filter paper occurs in EN ISO 11925-2, a d2 classification is given for flaming droplets and particles. If no ignition of the filter paper occurs, class E is obtained and no indication is given for d.



## 12 Classification criteria for floorings (see Table 2)

### 12.1 General

Performance levels for each specific parameter shall be determined from the test methods.

#### a) Continuous parameters

EN ISO 1182	$\Delta T$ $\Delta m$ $t_f$
EN ISO 1716	PCS
EN ISO 9239-1	Critical heat flux.

The mean value ( $m$ ) shall be determined for the performance level for each parameter. The classification shall then be determined from this value as described in 7.3.

#### b) Compliance parameter

EN ISO 11925-2	$F_s$ .
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The individual results shall be assessed to determine the classification as described in 7.4.

### 12.2 Class F<sub>fl</sub>

No performance criteria.

Class F<sub>fl</sub> also applies if a product fails to obtain class E<sub>fl</sub> when tested to EN ISO 11925-2.

### 12.3 Class E<sub>fl</sub>

The product shall satisfy the following criterion:

EN ISO 11925-2.

Under condition of surface flame attack with 15 s exposure time, there shall be no flame spread in excess of 150 mm vertically from the point of application of the test flame within 20 s from the time of application.

### 12.4 Class D<sub>fl</sub>

The product shall satisfy all of the following criteria:

#### a) EN ISO 11925-2

The product shall pass the E<sub>fl</sub> criterion.

#### b) EN ISO 9239-1

Critical heat flux  $\geq 3,0 \text{ kW/m}^2$ .

## 12.5 Class C<sub>R</sub>

The product shall satisfy all of the following criteria:

- a) EN ISO 11925-2

The product shall pass the E<sub>R</sub> criterion.

- b) EN ISO 9239-1

Critical heat flux  $\geq 4,5 \text{ kW/m}^2$ .

## 12.6 Class B<sub>R</sub>

The product shall satisfy all of the following criteria:

- a) EN ISO 11925-2

The product shall pass the E<sub>R</sub> criterion.

- b) EN ISO 9239-1:

Critical heat flux  $\geq 8,0 \text{ kW/m}^2$ .

## 12.7 Class A2<sub>R</sub>

### 12.7.1 General

The following criterion applies to both homogeneous and non-homogeneous products:

EN ISO 9239-1

Critical heat flux  $\geq 8,0 \text{ kW/m}^2$ .

### 12.7.2 Homogeneous products

The product shall satisfy the following criteria:

- a) EN ISO 1716

$PCS \leq 3,0 \text{ MJ/kg}$

or

- b) EN ISO 1182

$\Delta T \leq 50 \text{ }^\circ\text{C}$  and

$\Delta m \leq 50 \%$  and

$t_f \leq 20 \text{ s}$ .

### 12.7.3 Non-homogeneous products

Each substantial component shall satisfy the following criteria:

- a) EN ISO 1716

$$PCS \leq 3,0 \text{ MJ/kg}$$

or

- b) EN ISO 1182

$$\Delta T \leq 50 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f = 20 \text{ s.}$$

Each external non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 4,0 \text{ MJ/m}^2.$$

Each internal non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 4,0 \text{ MJ/m}^2.$$

The product as a whole shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 3,0 \text{ MJ/kg.}$$

## 12.8 Class A1<sub>n</sub>

### 12.8.1 Homogeneous products

The product shall satisfy the following criteria:

- a) EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg}$$

and

- b) EN ISO 1182

$$\Delta T \leq 30 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f = 0 \text{ s.}$$

### 12.8.2 Non-homogeneous products

Each substantial component shall satisfy the following criteria:

a) EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg}$$

and

b) EN ISO 1182

$$\Delta T \leq 30 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f = 0 \text{ s.}$$

Each external non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg.}$$

Each internal non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 1,4 \text{ MJ/m}^2.$$

The product as a whole shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg.}$$

## 12.9 Additional classifications s1, s2 for smoke production

### 12.9.1 General

Products classified A<sub>2fl</sub>, B<sub>fl</sub>, C<sub>fl</sub> and D<sub>fl</sub> obtain an additional classification of s1 or s2 regarding the smoke production.

### 12.9.2 s1

EN ISO 9239-1

The product shall satisfy the following criterion:

$$\text{Smoke} \leq 750 \% \times \text{minutes.}$$

### 12.9.3 s2

Products for which no performance is declared and products not satisfying the class s1 criterion.

## 13 Classification criteria for linear pipe thermal insulation products (see Table 3)

### 13.1 General

Performance levels for each specific parameter are determined from the test methods.

#### a) Continuous parameters

EN ISO 1182	$\Delta T$ $\Delta m$ $t_f$
EN ISO 1716	<i>PCS</i> and possibly <i>PCI</i>
EN 13823	<i>FIGRA</i> <sub>0,2 MJ</sub> and <i>FIGRA</i> <sub>0,4 MJ</sub> <i>THR</i> <sub>600s</sub> <i>SMOGRA</i> <i>TSP</i> <sub>600s</sub>

The mean value (*m*) shall be determined for the performance level for each parameter. The classification shall then be determined from this value as described in 7.3.

#### b) Compliance parameters

EN 13823	<i>LFS</i> and flaming droplets/particles
EN ISO 11925-2	<i>Fs</i> and flaming droplets/particles

The individual results for each parameter shall be assessed to determine the classification as described in 7.4.

### 13.2 Class F<sub>L</sub>

No performance criteria.

Class F<sub>L</sub> also applies if a product fails to obtain class E<sub>L</sub> when tested to EN ISO 11925-2.

### 13.3 Class E<sub>L</sub>

The product shall satisfy the following criteria:

EN ISO 11925-2.

Under conditions of surface flame attack and, where required, edge flame attack (see 6.3), with 15 s exposure time, there shall be no flame spread in excess of 150 mm vertically from the point of application of the test flame within 20 s from the time of application.

### 13.4 Class D<sub>L</sub>

The product shall satisfy all of the following criteria:

EN ISO 11925-2

Under condition of surface flame attack and, where required, edge flame attack (see 6.3), with 30 s exposure time, there shall be no vertical flame spread in excess of 150 mm from the point of application of the test flame within 60 s from the time of application.

— EN 13823

$$FIGRA (= FIGRA_{0,4MJ}) \leq 2\,100 \text{ W/s}$$

$$THR_{600s} \leq 100 \text{ MJ}$$

### 13.5 Class C<sub>L</sub>

The product shall satisfy all of the following criteria:

EN ISO 11925-2.

Under condition of surface flame attack and, where required, edge flame attack (see 6.3) with 30 s exposure time, there shall be no flame spread in excess of 150 mm vertically from the point of application of the test flame within 60 s from the time of application.

— EN 13823

No lateral flame spread (*LFS*) to the edge of the specimen.

$$FIGRA (= FIGRA_{0,2MJ}) \leq 460 \text{ W/s}$$

$$THR_{600s} \leq 15 \text{ MJ}$$

### 13.6 Class B<sub>L</sub>

The product shall satisfy all of the following criteria:

EN ISO 11925-2

Under condition of surface flame attack and, where required, edge flame attack (see 6.3) with 30 s exposure time, there shall be no flame spread in excess of 150 mm vertically from the point of application of the test flame within 60 s from the time of application.

— EN 13823

No lateral flame spread (*LFS*) to the edge of the specimen.

$$FIGRA (= FIGRA_{0,2MJ}) \leq 270 \text{ W/s}$$

$$THR_{600s} \leq 7,5 \text{ MJ}$$

### 13.7 Class A2<sub>L</sub>

#### 13.7.1 General

When tested in accordance with EN 13823 every class A2<sub>L</sub> product shall satisfy the same criteria as for class B<sub>L</sub> (see 13.6).

#### 13.7.2 Homogeneous products

The product shall satisfy the following criteria:

a) EN ISO 1716

$$PCS \leq 3,0 \text{ MJ/kg}$$

or

b) EN ISO 1182

$$\Delta T \leq 50 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f \leq 20 \text{ s.}$$

### 13.7.3 Non-homogeneous products

Each substantial component shall satisfy the following criteria:

a) EN ISO 1716

$$PCS \leq 3,0 \text{ MJ/kg}$$

or

b) EN ISO 1182

$$\Delta T \leq 50 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f \leq 20 \text{ s.}$$

Each external non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 4,0 \text{ MJ/m}^2.$$

Each internal non-substantial component shall satisfy the following criterion:

The product as a whole shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 3,0 \text{ MJ/kg.}$$

**NOTE** The *PCS* parameter includes a measure of the latent heat contained within any moisture vapour generated by any material during its combustion in the test according to EN ISO 1716:2002, Annex A and which during the fire process may not contribute to temperature rise. Therefore, products containing materials that can be shown to provide a *PCI* (as opposed to a *PCS* value) significantly less than the specified limits for the *PCS* can be considered as candidates for an appeal procedure.

## **13.8 Class A1<sub>L</sub>**

### **13.8.1 Homogeneous products**

The product shall satisfy all of the following criteria:

- a) EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg}$$

and

- b) EN ISO 1182

$$\Delta T \leq 30 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f = 0 \text{ s.}$$

### **13.8.2 Non-homogeneous products**

Each substantial component shall satisfy the following criterion:

- a) EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg}$$

and

- b) EN ISO 1182

$$\Delta T \leq 30 \text{ °C and}$$

$$\Delta m \leq 50 \% \text{ and}$$

$$t_f = 0 \text{ s.}$$

Each external non-substantial component shall satisfy all of the following criteria:

EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg.}$$

Each internal non-substantial component shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 1,4 \text{ MJ/m}^2.$$

The product as a whole shall satisfy the following criterion:

EN ISO 1716

$$PCS \leq 2,0 \text{ MJ/kg.}$$



**NOTE** The *PCS* parameter includes a measure of the latent heat contained within any moisture vapour generated by any material during its combustion in the test according to EN ISO 1716:2002, Annex A and which during the fire process may not contribute to temperature rise. Therefore, products containing materials that can be shown to provide a *PCI* (as opposed to a *PCS* value) significantly less than the specified limits for the *PCS* can be considered as candidates for an appeal procedure.

### **13.9 Additional classifications s1, s2, s3 for smoke production**

#### **13.9.1 General**

Products classified A<sub>2L</sub>, B<sub>L</sub>, C<sub>L</sub>, D<sub>L</sub> obtain an additional classification of s1, s2 or s3 regarding the smoke production.

#### **13.9.2 s1**

EN 13823

The product shall satisfy all of the following criteria:

$$SMOGRA \leq 105 \text{ m}^2/\text{s}^2 \text{ and}$$

$$TSP_{600s} \leq 250 \text{ m}^2.$$

#### **13.9.3 s2**

EN 13823

The product shall satisfy all of the following criteria:

$$SMOGRA \leq 580 \text{ m}^2/\text{s}^2 \text{ and}$$

$$TSP_{600s} \leq 1\,600 \text{ m}^2.$$

#### **13.9.4 s3**

Products for which no performance is declared or which do not comply with the s1 and s2 criteria.

### **13.10 Additional classifications d0, d1, d2 for flaming droplets and/or particles**

#### **13.10.1 Products classified A<sub>2L</sub>, B<sub>L</sub>, C<sub>L</sub>, D<sub>L</sub>**

Products classified A<sub>2L</sub>, B<sub>L</sub>, C<sub>L</sub>, D<sub>L</sub> obtain an additional classification of d0, d1 or d2 regarding the production of flaming droplets and/or particles as follows:

- d0, if no flaming droplets/particles occur within 600 s when tested in accordance with EN 13823;
- d1, if no flaming droplets/particles, persisting longer than 10 s, occur within 600 s when tested in accordance with EN 13823;
- d2 if no performance is declared, or if the product
  - a) does not comply with the d0 and d1 classification criteria given above or
  - b) ignites the paper in the ignitability test (EN ISO 11925-2).

### 13.10.2 Products classified E<sub>L</sub>

If ignition of the filter paper occurs in EN ISO 11925-2, a d2 classification is given for flaming droplets and particles. If no ignition of the filter paper occurs, class E<sub>L</sub> is obtained and no indication is given for d.

## 14 Presentation of classification

### 14.1 Construction products, excluding floorings and linear pipe thermal insulation products

The following classes for construction products, excluding floorings and linear pipe thermal insulation products are covered by this European Standard:

A1

A2-s1, d0                      A2-s1, d1                      A2-s1, d2

A2-s2, d0                      A2-s2, d1                      A2-s2, d2

A2-s3, d0                      A2-s3, d1                      A2-s3, d2

B-s1, d0                      B-s1, d1                      B-s1, d2

B-s2, d0                      B-s2, d1                      B-s2, d2

B-s3, d0                      B-s3, d1                      B-s3, d2

C-s1, d0                      C-s1, d1                      C-s1, d2

C-s2, d0                      C-s2, d1                      C-s2, d2

C-s3, d0                      C-s3, d1                      C-s3, d2

D-s1, d0                      D-s1, d1                      D-s1, d2

D-s2, d0                      D-s2, d1                      D-s2, d2

D-s3, d0                      D-s3, d1                      D-s3, d2

E

E-d2

F

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

## 14.2 Floorings

The following classes for floorings are covered by this European Standard:

A<sub>fl</sub>

A<sub>2fl-s1</sub>

A<sub>2fl-s2</sub>

B<sub>fl-s1</sub>

B<sub>fl-s2</sub>

C<sub>fl-s1</sub>

C<sub>fl-s2</sub>

D<sub>fl-s1</sub>

D<sub>fl-s2</sub>

E<sub>fl</sub>

F<sub>fl</sub>

NOTE When a classification includes s2, then this means that there is no limit set for smoke production.

## 14.3 Linear pipe thermal insulation products

The following classes for linear pipe thermal insulation products are covered by this European Standard:

A<sub>1L</sub>

A<sub>2L-s1, d0</sub>

A<sub>2L-s1, d1</sub>

A<sub>2L-s1, d2</sub>

A<sub>2L-s2, d0</sub>

A<sub>2L-s2, d1</sub>

A<sub>2L-s2, d2</sub>

A<sub>2L-s3, d0</sub>

A<sub>2L-s3, d1</sub>

A<sub>2L-s3, d2</sub>

B<sub>L-s1, d0</sub>

B<sub>L-s1, d1</sub>

B<sub>L-s1, d2</sub>

B<sub>L-s2, d0</sub>

B<sub>L-s2, d1</sub>

B<sub>L-s2, d2</sub>

B<sub>L-s3, d0</sub>

B<sub>L-s3, d1</sub>

B<sub>L-s3, d2</sub>

C<sub>L-s1, d0</sub>

C<sub>L-s1, d1</sub>

C<sub>L-s1, d2</sub>

C<sub>L-s2, d0</sub>

C<sub>L-s2, d1</sub>

C<sub>L-s2, d2</sub>

C<sub>L-s3, d0</sub>

C<sub>L-s3, d1</sub>

C<sub>L-s3, d2</sub>

D<sub>L-s1, d0</sub>

D<sub>L-s1, d1</sub>

D<sub>L-s1, d2</sub>

D<sub>L-s2, d0</sub>

D<sub>L-s2, d1</sub>

D<sub>L-s2, d2</sub>

D<sub>L-s3, d0</sub>

D<sub>L-s3, d1</sub>

D<sub>L-s3, d2</sub>

E<sub>L</sub>

E<sub>L-d2</sub>

F<sub>L</sub>

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

## 15 Field of application of the classification

The field of application of the classification is identical to the field of application resulting from the test(s), the test condition being determined in relation to the end use application. If different end use applications are envisaged for a particular product, this may result in different classifications.

In considering substrates and backings which can be applied in practice, EN 13238 specifies standard substrates for use in tests and also gives rules for the field of application of test results obtained using these standard substrates. Use of these substrates is not mandatory. The product may also be applied in end use condition or with a non-standard substrate representative of end use.

The applicability of test results using standard substrates given in EN 13238 is included in that standard.

Where non-standard substrates are used, the test result is limited to that same substrate in its end use application.

The applicability of test results obtained for products attached to a substrate is limited to the method of attachment used in the test. If generic adhesives are used, the results apply for all adhesives of the same type, applied in similar quantities. 'Generic' refers to adhesives giving the same or higher reaction to fire classification to the product in question, as that tested. Subject to the above, 'generic' may also apply to adhesives of a defined type (e.g. polyvinylpyrrolidone, polyvinylacetate). If specific adhesives are used, the results apply only for the specific adhesives.

The reaction to fire classification may be valid for products within the same family, where family is defined as a range of products within defined limits of variability of its parameters, e.g. thickness, density, end use application, for which the reaction to fire classification is proven to be unchanged.

NOTE Rules for direct and extended application are given in CEN/TS 15117.

## 16 Classification report

### 16.1 General

The aim of the classification report is to provide a harmonised way of presenting the classification of a product, based on results obtained during tests in accordance with the reaction to fire test methods.

A classification report is expected to detail the basis and the results of the classification process.

### 16.2 Content and format

The classification report shall have the following content and format (see Annex B):

- a) identification number and date of the classification report;
- b) identification of the owner of the classification report;
- c) identification of the organisation issuing the classification report;
- d) details of the nature and use of the product under classification, including its commercial name(s);
- e) detailed description of the product;

Either reference is made to a detailed description of the product as available in one of the test reports in support of this classification, or a detailed description is reproduced in this classification report. The detailed description shall include a full description and identification of all relevant components and the method of assembly etc. If generic products are used a general description is sufficient. If special products are used, however, e.g. fire retardant glues, all commercial references shall be given.

It shall also include relevant product specifications applicable to the whole or parts of the classified product.

- f) test(s) carried out;
  - 1) all test reports used in support of this classification are identified by;
    - i) the name of the laboratory carrying out the tests;
    - ii) the name of the sponsor;
    - iii) the test and test report identification number;
  - 2) identification of the tests carried out in accordance with the standard and the envisaged field of application;
  - 3) test results for each specimen tested;
- g) classification and field of application;
  - 1) reference to the relevant classification procedure in this European Standard;
  - 2) conclusion: classification of the construction product;
  - 3) detailed description of the field of direct application, i.e. the end use conditions of this classification report;
- h) additional statements;

The classification report shall include:

The classification report shall include:

- 1) any restrictions on the duration of the validity of this classification report;
  - 2) a warning 'This document does not represent type approval or certification of the product';
- i) name and signature of the person(s) responsible for the classification report.

36

**Table 1 — Classes of reaction to fire performance for construction products excluding floorings and linear pipe thermal insulation products**

Class	Test method(s)	Classification criteria	Additional classification
<b>A1</b>	EN ISO 1182 <sup>a</sup>	$\Delta T \leq 30$ °C; and $\Delta m \leq 50$ %; and $t_f = 0$ (i.e. no sustained flaming)	-
	and EN ISO 1716	$PCS \leq 2,0$ MJ/kg <sup>a</sup> and $PCS \leq 2,0$ MJ/kg <sup>b c</sup> and $PCS \leq 1,4$ MJ/m <sup>2</sup> <sup>d</sup> and $PCS \leq 2,0$ MJ/kg <sup>e</sup>	-
<b>A2</b>	EN ISO 1182 <sup>a</sup>	$\Delta T \leq 50$ °C; and $\Delta m \leq 50$ %; and $t_f \leq 20$ s	-
	or EN ISO 1716	$PCS \leq 3,0$ MJ/kg <sup>a</sup> and $PCS \leq 4,0$ MJ/m <sup>2</sup> <sup>b</sup> and $PCS \leq 4,0$ MJ/m <sup>2</sup> <sup>d</sup> and $PCS \leq 3,0$ MJ/kg <sup>e</sup>	-
	and EN 13823	$FIGRA \leq 120$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 7,5$ MJ	Smoke production <sup>f</sup> and Flaming droplets/particles <sup>g</sup>
<b>B</b>	EN 13823	$FIGRA \leq 120$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 7,5$ MJ	Smoke production <sup>f</sup> and Flaming droplets/particles <sup>g</sup>
	and EN ISO 11925-2 <sup>h</sup> : Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
<b>C</b>	EN 13823	$FIGRA \leq 250$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 15$ MJ	Smoke production <sup>f</sup> and Flaming droplets/particles <sup>g</sup>
	and EN ISO 11925-2 <sup>h</sup> : Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
<b>D</b>	EN 13823	$FIGRA \leq 750$ W/s	Smoke production <sup>f</sup> and Flaming droplets/particles <sup>g</sup>
	and EN ISO 11925-2 <sup>h</sup> : Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
<b>E</b>	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150$ mm within 20 s	Flaming droplets/particles <sup>h</sup>
<b>F</b>	No performance determined		

- <sup>a</sup> For homogeneous products and substantial components of non-homogeneous products.
- <sup>b</sup> For any external non-substantial component of non-homogeneous products.
- <sup>c</sup> Alternatively, any external non-substantial component having a  $PCS \leq 2,0 \text{ MJ/m}^2$ , provided that the product satisfies the following criteria of EN 13823:  $FIGRA \leq 20 \text{ W/s}$ , and  $LFS < \text{edge of specimen}$ , and  $THR_{600s} \leq 4,0 \text{ MJ}$ , and s1, and d0.
- <sup>d</sup> For any internal non-substantial component of non-homogeneous products.
- <sup>e</sup> For the product as a whole.
- <sup>f</sup> In the last phase of the development of the test procedure, modifications of the smoke measurement system have been introduced, the effect of which needs further investigation. This may result in a modification of the limit values and/or parameters for the evaluation of the smoke production.
- s1** =  $SMOGRA \leq 30 \text{ m}^2/\text{s}^2$  and  $TSP_{600s} \leq 50 \text{ m}^2$ ; **s2** =  $SMOGRA \leq 180 \text{ m}^2/\text{s}^2$  and  $TSP_{600s} \leq 200 \text{ m}^2$ ; **s3** = not s1 or s2
- <sup>g</sup> **d0** = No flaming droplets/ particles in EN 13823 within 600 s;
- d1** = no flaming droplets/ particles persisting longer than 10 s in EN 13823 within 600 s;
- d2** = not d0 or d1.
- Ignition of the paper in EN ISO 11925-2 results in a d2 classification.
- <sup>h</sup> Pass = no ignition of the paper (no classification);
- Fail = ignition of the paper (d2 classification).
- <sup>i</sup> Under conditions of surface flame attack and, if appropriate to the end-use application of the product, edge flame attack.

**Table 2 — Classes of reaction to fire performance for floorings**

Class	Test method(s)	Classification criteria	Additional classifications
<b>A1<sub>n</sub></b>	EN ISO 1182 <sup>a</sup>	$\Delta T \leq 30 \text{ }^\circ\text{C}$ ; and $\Delta m \leq 50 \%$ ; and $t_f = 0$ (i.e. no sustained flaming)	-
	and EN ISO 1716	$PCS \leq 2,0 \text{ MJ/kg}$ <sup>a</sup> and $PCS \leq 2,0 \text{ MJ/kg}$ <sup>b</sup> and $PCS \leq 1,4 \text{ MJ/m}^2$ <sup>c</sup> and $PCS \leq 2,0 \text{ MJ/kg}$ <sup>d</sup>	-
<b>A2<sub>n</sub></b>	EN ISO 1182 <sup>a</sup> or	$\Delta T \leq 50 \text{ }^\circ\text{C}$ and $\Delta m \leq 50 \%$ and $t_f \leq 20 \text{ s}$	-
	and EN ISO 1716	$PCS \leq 3,0 \text{ MJ/kg}$ <sup>a</sup> and $PCS \leq 4,0 \text{ MJ/m}^2$ <sup>b</sup> and $PCS \leq 4,0 \text{ MJ/m}^2$ <sup>c</sup> and $PCS \leq 3,0 \text{ MJ/kg}$ <sup>d</sup>	-
	EN ISO 9239-1 <sup>e</sup>	Critical flux $^f \geq 8,0 \text{ kW/m}^2$	Smoke production <sup>g</sup>
<b>B<sub>n</sub></b>	EN ISO 9239-1 <sup>e</sup> and	Critical flux $^f \geq 8,0 \text{ kW/m}^2$	Smoke production <sup>g</sup>
	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
<b>C<sub>n</sub></b>	EN ISO 9239-1 <sup>e</sup> and	Critical flux $^f \geq 4,5 \text{ kW/m}^2$	Smoke production <sup>g</sup>
	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
<b>D<sub>n</sub></b>	EN ISO 9239-1 <sup>e</sup> and	Critical flux $^f \geq 3,0 \text{ kW/m}^2$	Smoke production <sup>g</sup>
	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
<b>E<sub>n</sub></b>	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
<b>F<sub>n</sub></b>	No performance determined		

- a For homogeneous products and substantial components of non-homogeneous products.
- b For any external non-substantial component of non-homogeneous products.
- c For any internal non-substantial component of non-homogeneous products.
- d For the product as a whole.
- e Test duration = 30 min.
- f Critical flux is defined as the radiant flux at which the flame extinguishes or the radiant flux after a test period of 30 min, whichever is the lower (i.e. the flux corresponding with the furthest extent of spread of flame).
- g s1 = Smoke  $\leq$  750 % minutes;  
s2 = not s1.
- h Under conditions of surface flame attack and, if appropriate to the end use application of the product, edge flame attack.



**Table 3 — Classes of reaction to fire performance for linear pipe thermal insulation products**

Class	Test method(s)	Classification criteria	Additional classification
<b>A1<sub>L</sub></b>	EN ISO 1182 <sup>a</sup>	$\Delta T \leq 30$ °C; and $\Delta m \leq 50$ %; and $t_f = 0$ (i.e. no sustained flaming)	-
	and EN ISO 1716	$PCS \leq 2,0$ MJ/kg <sup>a</sup> and $PCS \leq 2,0$ MJ/kg <sup>b</sup> and $PCS \leq 1,4$ MJ/m <sup>2</sup> <sup>c</sup> and $PCS \leq 2,0$ MJ/kg <sup>d</sup>	-
<b>A2<sub>L</sub></b>	EN ISO 1182 <sup>a</sup>	$\Delta T \leq 50$ °C; and $\Delta m \leq 50$ %; and $t_f \leq 20$ s	-
	or EN ISO 1716	$PCS \leq 3,0$ MJ/kg <sup>a</sup> and $PCS \leq 4,0$ MJ/m <sup>2</sup> <sup>b</sup> and $PCS \leq 4,0$ MJ/m <sup>2</sup> <sup>c</sup> and $PCS \leq 3,0$ MJ/kg <sup>d</sup>	-
	and EN 13823	$FIGRA \leq 270$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 7,5$ MJ	Smoke production <sup>e</sup> and Flaming droplets/particles <sup>f</sup>
<b>B<sub>L</sub></b>	EN 13823	$FIGRA \leq 270$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 7,5$ MJ	Smoke production <sup>e</sup> and Flaming droplets/particles <sup>f</sup>
	and EN ISO 11925-2 <sup>h</sup> ; Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
<b>C<sub>L</sub></b>	EN 13823	$FIGRA \leq 460$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 15$ MJ	Smoke production <sup>e</sup> and Flaming droplets/particles <sup>f</sup>
	and EN ISO 11925-2 <sup>h</sup> ; Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
<b>D<sub>L</sub></b>	EN 13823	$FIGRA \leq 2\ 100$ W/s $THR_{600s} \leq 100$ MJ	Smoke production <sup>e</sup> and Flaming droplets/particles <sup>f</sup>
	and EN ISO 11925-2 <sup>h</sup> ; Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
<b>E<sub>L</sub></b>	EN ISO 11925-2 <sup>h</sup> ; Exposure = 15 s	$F_s \leq 150$ mm within 20 s	Flaming droplets/particles <sup>g</sup>
<b>F<sub>L</sub></b>	No performance determined		

<sup>a</sup> For homogeneous products and substantial components of non-homogeneous products.

<sup>b</sup> For any external non-substantial component of non-homogeneous products.

<sup>c</sup> For any internal non-substantial component of non-homogeneous products.

<sup>d</sup> For the product as a whole.

<sup>e</sup>  $s1 = SMOGRA \leq 105$  m<sup>2</sup>/s<sup>2</sup> and  $TSP_{600s} \leq 250$  m<sup>2</sup>;  $s2 = SMOGRA \leq 580$  m<sup>2</sup>/s<sup>2</sup> and  $TSP_{600s} \leq 1\ 600$  m<sup>2</sup>;

$s3 =$  not  $s1$  or  $s2$

<sup>f</sup> **d0** = No flaming droplets/ particles in EN 13823 within 600 s;

**d1** = No flaming droplets/ particles persisting longer than 10 s in EN 13823 within 600 s;

**d2** = not **d0** or **d1**.

Ignition of the paper in EN ISO 11925-2 results in a **d2** classification.

<sup>g</sup> Pass = no ignition of the paper (no classification);

Fail = ignition of the paper (**d2** classification).

<sup>h</sup> Under conditions of surface flame attack and, if appropriate to the end-use application of the product, edge flame attack.

## **Annex A** (informative)

### **Background information for the application of the Commission Decision of 8 February 2000 implementing Council Directive 89/106/EEC as regards the classification of the reaction to fire performance of construction products**

#### **A.1 General**

This annex provides background information concerning the reaction to fire classification of a product that, in its end-use application, can contribute to the generation and spread of fire and smoke within the room of origin or in a given area.

It explains the basis of the classification given in tables of the Commission Decision 2000/147/EC and therefore uses terms of that document and gives explanations consistent with that document.

#### **A.2 Assumptions**

**A.2.1** For all construction products, the consideration is of a fire, initiated in a room, which can grow and eventually reach flashover. This scenario includes three fire situations corresponding to three stages in the development of a fire.

- a) The first stage includes initiation of the fire by ignition of a product, with a small flame, on a limited area of a product.
- b) The second stage addresses fire growth eventually reaching flashover. It is simulated by a single burning item in a corner of the room, creating a heat flux on adjacent surfaces. For floorings, fire is seen to grow in the room of origin, creating a heat flux on the floorings in an adjacent room or corridor, through a door opening.
- c) In the post-flashover phase all combustible products contribute to the fire load.

**A.2.2** The validation of the classification of products in terms of their contribution to fire growth and post flashover fires is based on a large scale scenario. It is assumed that this classification is representative of other scenarios.

A similar simplifying assumption is made to apply the same classification to different orientations and geometries and to product types other than room surface products.

Products are considered in relation to their end use application. If the classification based on one of the test methods and criteria listed in Tables 1, 2 and 3 is not appropriate, one or more reference scenarios can be called upon. Such scenarios can be described in a future European Standard or Commission Decision.

**A.2.3** Different classes address exposure of the product at different stages of the fire development in the reference scenarios. Figure A.1 demonstrates the relationship between the classes and the ISO 9705:1993 test used as a reference scenario for the definition of class limits.

**A.2.4** There is no unequivocal relationship between different behavioural characteristics, or between similar characteristics under different fire exposures valid for all products. Different classes address to a certain extent different exposures and different behavioural characteristics. Nevertheless,

a higher classification should represent at least the same performance in each relevant characteristic, but should also represent a better performance, if all behavioural aspects relevant for the given class are considered.

**A.2.5** The assumption is that products classified as A1 make no contribution to fire growth or to the fully developed fire.

A product classified as A1 is assumed to present no smoke hazard.

**A.2.6** A principle generally accepted is that tests carried out in more severe conditions are accepted as valid for all less severe ones. In some cases, a typical end use can cover a more severe end use. For example, EN 13823 and EN ISO 11925-2, carried out in vertical orientation, are used for all other orientations, or tests on a product facing an open space are used for the same product exposed within vertical and horizontal voids.

### **A.3 Reference fire situations**

#### **A.3.1 Reference fire situations for construction products, linear pipe thermal insulation products but except floorings**

a) Small fire attack on a limited area

Exposure: small flame without imposed radiation

Geometry: - vertical specimen

- surface and edge attack

Fire situation: initial flame attack

Performance aspects to be considered: - extent of burning and damage as a function of time

- flaming droplets/particles

b) Single burning item in a room

Exposure: single burning item

Geometry: - corner

- corner attack

Fire situation: pre-flashover

Performance aspects to be considered: - flame spread

- heat and smoke release

- flaming droplets / particles

c) Fully developed fire in a room

Exposure: post-flashover fire

Geometry: any

Fire situation: any including post-flashover

Performance aspects to be considered: - heat and smoke release  
- flame spread

### A.3.2 Reference fire situations for floorings

a) Small fire attack on a limited area

Exposure: small flame without imposed radiation

Geometry: - vertical specimen  
- surface attack

Fire situation: initial flame attack

Performance aspects to be considered: - extent of burning and damage as a function of time

b) Fully developed fire in an adjacent room

Exposure: radiation on a limited area

Geometry: horizontal specimen

Fire situation: fully developed fire in an adjacent room

Performance aspects to be considered: - critical heat flux (= extent of spread of flame)  
- smoke production

NOTE Floorings are not evaluated in respect of their contribution to the fire growth in the room of origin.

c) Fully developed fire in a room

Exposure: post-flash-over fire

Geometry: any

Fire situation: any including post-flash-over

Performance aspects to be considered: - heat and smoke release  
- fire spread

## A.4 Relationship between classes and reference fire situations

### A.4.1 General

This relationship is specified as follows, and shown in the Figure A.1.

### A.4.2 For all construction products excluding floorings

- Class F, F<sub>L</sub>: Products for which no reaction to fire performances are determined or which cannot be classified in one of the classes A1, A2, B, C, D, E, A1<sub>L</sub>, A2<sub>L</sub>, B<sub>L</sub>, C<sub>L</sub>, D<sub>L</sub>, E<sub>L</sub>
- Class E, E<sub>L</sub>: Products capable of resisting, for a short period, a small flame attack without substantial flame spread.
- Class D, D<sub>L</sub>: Products satisfying criteria for class E and E<sub>L</sub> and capable of resisting, for a longer period, a small flame attack without substantial flame spread. In addition, they are also capable of undergoing thermal attack by a single burning item with sufficiently delayed and limited heat release.
- Class C, C<sub>L</sub>: As class D and D<sub>L</sub> but satisfying more stringent requirements.  
Additionally under the thermal attack by a single burning item they have a limited lateral spread of flame.
- Class B, B<sub>L</sub>: As class C and C<sub>L</sub> but satisfying more stringent requirements.
- Class A2, A2<sub>L</sub>: Satisfying the same criteria as class B and B<sub>L</sub> for the EN 13823. In addition, under conditions of a fully developed fire these products will not significantly contribute to the fire load and fire growth.
- Class A1, A1<sub>L</sub>: Class A1 and A1<sub>L</sub> products will not contribute in any stage of the fire including the fully developed fire. For that reason they are assumed to be capable of satisfying automatically all requirements of all lower classes.

#### Additional classifications for smoke production

- s3 No limitation of smoke production required
- s2 The total smoke production as well as the ratio of increase in smoke production are limited
- s1 More stringent criteria than s2 are satisfied

#### Additional classifications for flaming droplets/particles

- d2 No limitation
- d1 No flaming droplets/particles persisting longer than a given time occurred
- d0 No flaming droplets/particles occurred

### A.4.3 For floorings

- Class F<sub>f</sub>: Products for which no reaction to fire performance is determined or which cannot be classified in one of the classes A1<sub>f</sub>, A2<sub>f</sub>, B<sub>f</sub>, C<sub>f</sub>, D<sub>f</sub>, E<sub>f</sub>.
- Class E<sub>f</sub>: Products capable of resisting a small flame.

## EN 13501-1:2007 (E)

**Class D<sub>fl</sub>:** Products satisfying E<sub>fl</sub> and in addition capable of resisting, for a certain period, a heat flux attack.

**Class C<sub>fl</sub>:** As class D<sub>fl</sub> but satisfying more stringent requirements.

**Class B<sub>fl</sub>:** As class C<sub>fl</sub> but satisfying more stringent requirements.

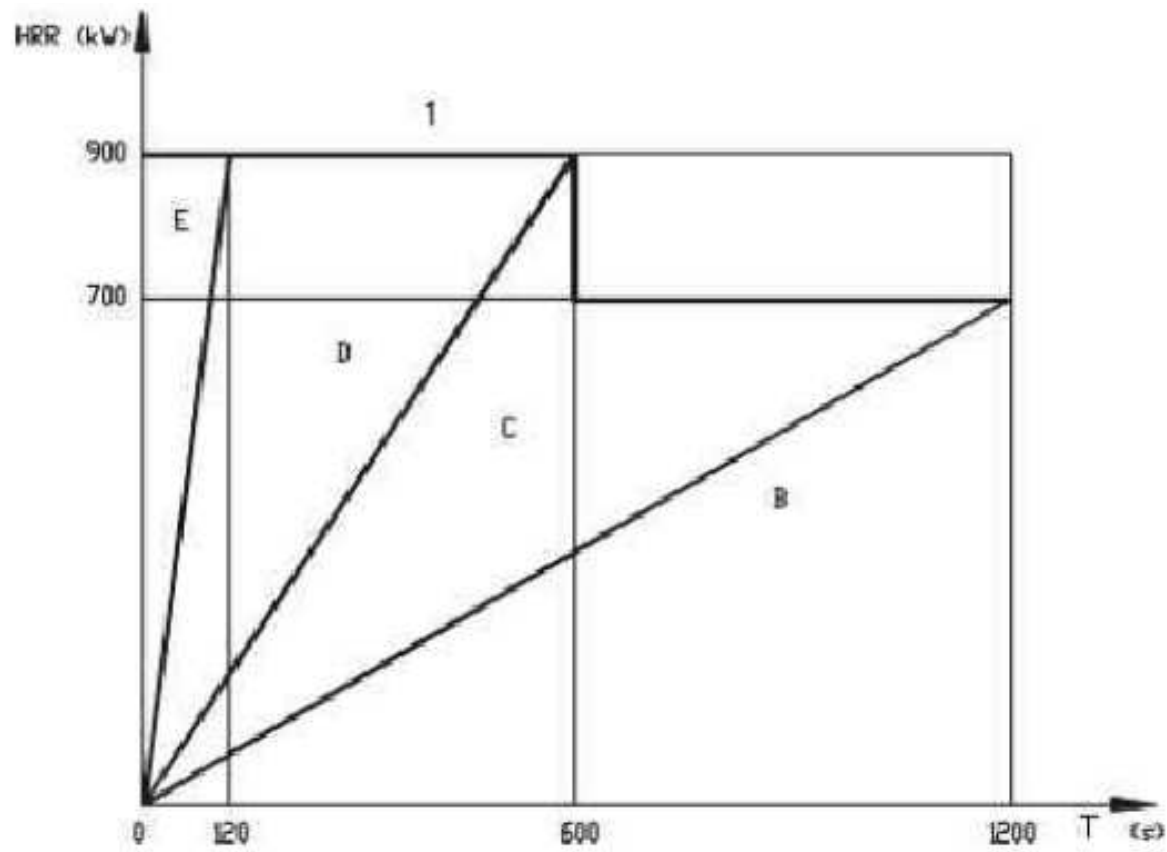
**Class A2<sub>fl</sub>:** Satisfying the same requirement as class B<sub>fl</sub> relating to heat flux. In addition, under the conditions of a fully developed fire these products will not significantly contribute to the fire load and fire growth.

**Class A1<sub>fl</sub>:** Class A1<sub>fl</sub> products will not contribute in any stage of the fire, including the fully developed fire. For that reason they are assumed to be capable of satisfying automatically all requirements of all lower classes.

Additional classifications for smoke production:

**s2** No limit;

**s1** The total smoke production is limited.

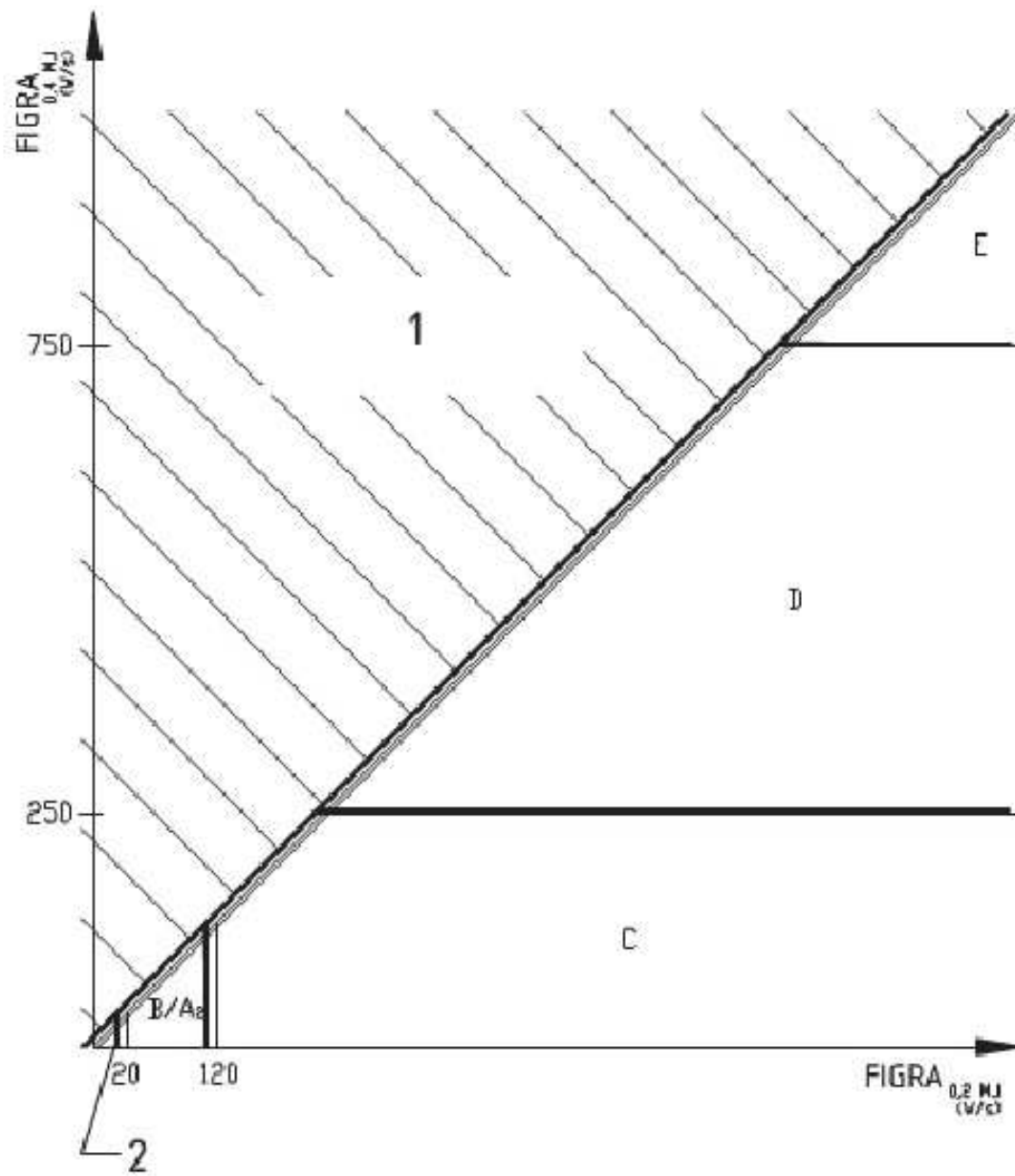


**Key**

- 1 flashover
- B class B/A2
- C no flashover for 100 kW but flashover
- D flashover after more than 2 min for 100 kW ignition source
- E flashover before 2 min for 100 kW ignition source
- T Time

NOTE HRR from the specimen excludes the burner.

**Figure A.1 — Relationship between classes as defined in Table 1, and ISO 9705:1993 test results**



**Key**

- 1 this area has no significance, as by definition  $FIGRA_{0,2MJ} \leq FIGRA_{0,4MJ}$
- 2 special procedure for class A1

**Figure A.2 — Informative illustration of the relationship between  $FIGRA_{0,2MJ}$  and  $FIGRA_{0,4MJ}$  and the classes**



## Annex B (normative)

### Reaction to fire classification report

The following shows the layout and the format of the classification report:

#### 1 Introduction

This classification report defines the classification assigned to *product name (as described by the sponsor)* in accordance with the procedures given in EN 13501-1:2007

Logo of body issuing  
classification report

(Text/information to be provided by the author of the classification report (Notified Body\*) is indicated in *italic text*)

### CLASSIFICATION OF REACTION TO FIRE IN ACCORDANCE WITH EN 13501-1:2007

**Sponsor:** *name and address of sponsor*

**Prepared by:** *name & address of Notified\* Body issuing classification report*

**Notified Body No.:** *number of Notified Body which prepared classification\**

**Product name:** *as described by the sponsor*

**Classification report No.:** *number of classification report*

**Issue number:** *issue number*

**Date of issue:** *date of issue*

This classification report consists of five pages and may only be used or reproduced in its entirety.

\* To be used for CE marking only

## 2 Details of classified product

### 2.1 General

The product, *product name (as described by the sponsor)*, is defined as a *type of product (according to relevant European Technical Specification\*)*.

\* To be used for CE marking

### 2.2 Product description

The product, *product name (as described by the sponsor)*, is described below or is described in the test reports provided in support of classification listed in 3.1.

Product description:

*Insert product description here.*

(Use tabulated data templates wherever possible)

## 3. Test reports & test results in support of classification

### 3.1 Test reports

Enter details of reports here as applicable

<b>Name of Laboratory</b>	<b>Name of sponsor</b>	<b>Test reports Nos.</b>	<b>Test method</b>
<i>Name of test laboratory</i>	<i>Name of sponsor</i>	<i>Report No</i>	<i>Test</i>
<i>Name of test laboratory</i>	<i>Name of sponsor</i>	<i>Report No</i>	<i>Test</i>
<i>Name of test laboratory</i>	<i>Name of sponsor</i>	<i>Report No</i>	<i>Test</i>

### 3.2 Test results

Test method and test number	Parameter	No. tests	Results	
			Continuous parameter - mean (m)	Compliance with parameters
<i>first test method</i>	<i>parameter 1</i>	<i>number of tests</i>	<i>result 1</i>	<i>Compliant or non-compliant</i>
	<i>parameter 2</i>		<i>result 2</i>	<i>Compliant or non-compliant</i>
	<i>parameter 3</i>		<i>result 3</i>	<i>Compliant or non-compliant</i>
<i>second test method (if appropriate)</i>	<i>parameter 1</i>	<i>number of tests</i>	<i>result 1</i>	<i>Compliant or non-compliant</i>
	<i>parameter 2</i>		<i>result 2</i>	<i>Compliant or non-compliant</i>

## 4 Classification and field of application

### 4.1 Reference of classification

This classification has been carried out in accordance with EN 13501-1:2007.

### 4.2 Classification

The product, *product name (as described by the sponsor)*, in relation to its reaction to fire behaviour is classified:

**A1 to F, A1<sub>n</sub> to F<sub>n</sub> or A1<sub>L</sub> to F<sub>L</sub> (as applicable)**

The additional classification in relation to smoke production is:

**s1, s2, s3 (as applicable)**

The additional classification in relation to flaming droplets / particles is:

### **d0, d1, d2 (as applicable)**

The format of the reaction to fire classification for construction products excluding floorings and linear pipe thermal insulation products is:

<b>Fire behaviour</b>		<b>Smoke production</b>			<b>Flaming droplets</b>	
<b>A1 to F</b> (as applicable)	-	<b>s</b>	<b>1, 2 or 3</b> (as applicable)	,	<b>d</b>	<b>0, 1 or 2</b> (as applicable)

i.e. **A1 to F** (as applicable) – **s1, 2 or 3** (as applicable), **d0, 1 or 2** (as applicable)

The format of the reaction to fire classification for floorings is:

<b>Fire behaviour</b>		<b>Smoke production</b>	
<b>A1<sub>f</sub> to F<sub>f</sub></b> (as applicable)	-	<b>s</b>	<b>1 or 2</b> (as applicable)

i.e. **A1<sub>f</sub> to F<sub>f</sub>** (as applicable) – **s1 or 2** (as applicable)

The format of the reaction to fire classification for linear pipe thermal insulation products is:

<b>Fire behaviour</b>		<b>Smoke production</b>			<b>Flaming droplets</b>	
<b>A1<sub>L</sub> to F<sub>L</sub></b> (as applicable)	-	<b>s</b>	<b>1, 2 or 3</b> (as applicable)	,	<b>d</b>	<b>0, 1 or 2</b> (as applicable)

i.e. **A1<sub>L</sub> to F<sub>L</sub>** (as applicable) – **s1, 2 or 3** (as applicable), **d0, 1 or 2** (as applicable)

## **Reaction to fire classification: classification**

### **4.3 Field of application**

This classification is valid for the following product parameters (e.g. thickness, density...):

<i>product property 1</i>	<i>Variation in product property 1</i>
<i>product property 2</i>	<i>Variation in product property 2</i>
<i>product property 3</i>	<i>Variation in product property 3</i>
<i>product property 4</i>	<i>Variation in product property 4</i>
<i>product property x etc.</i>	<i>Variation in product property x etc.</i>

*(include reference to the reference document + date used for undertaking this)*

The classification is valid for the following end use applications:

*Details of substrates and/or air gaps*

*Details of methods and means of fixing*

*Details of joints*

*Details of other aspects of end use conditions*

## **5 Limitations**

This classification document does not represent type approval or certification of the product.

*Include the following statement when the product is being CE marked under attestation of conformity system 3:*

"The classification assigned to the product in this report is appropriate to a declaration of conformity by the manufacturer within the context of system 3 attestation of conformity and CE marking under the Construction Products Directive.

The manufacturer has made a declaration, which is held on file. This confirms that the products design requires no specific processes, procedures or stages (e.g. no addition of flame-retardants, limitation of organic content, or addition of fillers) that are aimed at enhancing the fire performance in order to obtain the classification achieved. As a consequence the manufacturer has concluded that system 3 attestation is appropriate.

The test laboratory has, therefore, played no part in sampling the product for the test, although it holds appropriate references, supplied by the manufacturer, to provide for traceability of the samples tested."

**SIGNED**

**APPROVED**

*signature of person undertaking classification*

*signature of person authorising this report*

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