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

Classement au feu 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 9 November 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## European foreword

This document (EN 13501-1:2018) 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of an identical text or by endorsement, at the latest by June 2019, and conflicting national standards shall be withdrawn at the latest by September 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13501-1:2007+A1:2009.

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

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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*
- *Part 6: Classification using data from reaction to fire tests on power, control and communication cables.*

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the 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 and the relevant field of application procedures.

This European Standard has been prepared in support of the second essential requirement in the EC Construction Products Regulation (305/2011/EU) and as detailed in the Interpretative Document Number 2: Safety in case of fire (OJ C62 Vol. 37).

Background information on the Commission Delegated Regulation (2016/364) 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.

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. Part 6 covers classification resulting from tests for reaction to fire of cables.

NOTE Test reports constitute the basis for extended application reports as explained in EN 15725.

## 1 Scope

This document provides the reaction to fire classification procedure for all construction products, including products incorporated within building elements with the exception of power, control and communication cables which are covered by EN 13501-6.

Products are considered in relation to their end use application.

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

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

NOTE For CE marking of construction products under the Construction Product Regulation ((EC) 305/2011) the NPD option can be used when no reaction of fire performance is to be declared.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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*

CEN/TS 15117, *Guidance on direct and extended application*

EN 15725, *Extended application reports on the fire performance of construction products and building elements*

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

EN ISO 1716:2010, *Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value) (ISO 1716:2010)*

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)*

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

## 3 Terms, definitions and symbols

### 3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 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 1 to entry: 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 1 to entry: 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

**3.1.11****substrate**

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

Note 1 to entry: 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 1 to entry: 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 a material, product or assembly in a fire

Note 1 to entry: It is often important to understand how materials, products or assemblies behave in real fires as opposed to in fire tests under controlled conditions. Improved fire performance can be exhibited in a variety of ways. For example, longer times to ignition, lower heat release, lower flame spread or lower smoke release could all be evidence of improvements in fire performance.

Note 2 to entry: Compare with the term fire behaviour.

[SOURCE: EN ISO 13943:2017, 3.137]

**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**

qualitative description of the course of a fire with respect to time, identifying key events that characterize the studied fire and differentiate it from other possible fires

Note 1 to entry: See fire scenario cluster and representative fire scenario .

Note 2 to entry: It typically defines the ignition and fire growth processes, the fully developed fire stage, the fire decay stage, and the environment and systems that will impact on the course of the fire.

Note 3 to entry: Unlike deterministic fire analysis, where fire scenarios are individually selected and used as design fire scenarios, in fire risk assessment, fire scenarios are used as representative fire scenarios within fire scenario clusters.

[SOURCE: EN ISO 13943:2017, 3.152]

### 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 oxidizing agent

Note 1 to entry: Combustion generally emits effluent accompanied by flames and/or visible light.

[SOURCE: EN ISO 13943:2017, 3.55]

### 3.1.20

#### **heat of combustion**

thermal energy produced by combustion of unit of mass of a given substance

Note 1 to entry: It is expressed in joules per kilogram.

[SOURCE: EN ISO 13943:2017, 3.203]

### 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

[SOURCE: EN ISO 13943:2017, 3.198]

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

heat of combustion when any water produced is considered to be in the gaseous state

Note 1 to entry: The net heat of combustion is always smaller than the gross heat of combustion because the heat released by the condensation of water vapour is not included.

Note 2 to entry: The typical unit is  $\text{kJ}\cdot\text{g}^{-1}$ .

Note 3 to entry: The net heat of combustion may be calculated from the gross heat of combustion.

[SOURCE: EN ISO 13943:2017, 3.280]

**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 a test specimen can be ignited, under specified conditions

[SOURCE: EN ISO 13943:2017, 3.212]

**3.1.25****heat release**

thermal energy produced by *combustion*

Note 1 to entry: The typical unit is J.

[SOURCE: EN ISO 13943:2017, 3.205]

**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 ( $F_s$ ) is the highest point reached by the flame tip, as evaluated in the test in EN ISO 11925-2

Note 1 to entry: Lateral flame spread is the furthest extent of travel of a sustained flame, as specified in the EN 13823 test.

**3.1.29**

**sustained flaming**

flame on or over the surface of a test specimen, which persists for longer than a defined period of time

Note 1 to entry: The defined period of time varies across different standards.

Note 2 to entry: Typically, the same defined period is used to define “transitory flaming” or “transient flaming” and the specific test method defines the applicable defined period of time.

[SOURCE: EN ISO 13943:2017, 3.380]

**3.1.30**

**fully developed fire**

state of total involvement of combustible materials in a fire

[SOURCE: EN ISO 13943:2017, 3.192]

**3.1.31**

**flashover**

transition to a state of total surface involvement in a fire of combustible materials within an enclosure

[SOURCE: EN ISO 13943:2017, 3.184]

**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 at the surface of a specimen at the point where the flame ceases to advance and may subsequently go out

Note 1 to entry: The heat flux value reported is based on interpolations of measurements with a non-combustible calibration board.

Note 2 to entry: The typical unit is kW/m<sup>2</sup>.

**3.1.34**

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

total heat flux received by the specimen at the most distant spread of flame position observed during the first X minutes of the test

Note 1 to entry: The typical unit is kW/m<sup>2</sup>.

**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 1 to entry: 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 A2<sub>L</sub>, B<sub>L</sub>, and C<sub>L</sub>,  $FIGRA = FIGRA_{0,2MJ}$

For the class D<sub>L</sub>,  $FIGRA = FIGRA_{0,4MJ}$

**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 1 to entry:  $FIGRA_{0,2MJ}$  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 1 to entry: 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 1 to entry: The *SMOGRA* is defined in more detail in EN 13823.

**3.1.41****direct field of application**

outcome of a process (involving the application of defined rules) whereby a test result is deemed to be equally valid for variations in one or more of the product properties and/or intended end use applications

**3.1.42****extended field of application**

outcome of a process (involving the application of defined rules that may incorporate calculation procedures) that predicts, for a variation of a product property and/or its intended end use application(s), a test result on the basis of one or more test results to the same test standard

**3.1.43****extended application result**

predicted result for performance parameter obtained following the process of extended field of application

### 3.1.44

#### extended application report

document reporting extended application results, including all details of the process leading to those results, prepared in accordance with EN 15725

## 3.2 Symbols and abbreviations

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

NOTE If different, the definition of symbol in the delegated regulation (2016/364/EC of 1st July 2016 - OJEU L68/6 on 15<sup>th</sup> March 2017) is given between brackets.

$\Delta T$	temperature rise [K]
$\Delta m$	mass loss [%]
$F_s$	flame spread [compliance parameter]
<i>FIGRA</i>	fire growth rate index used for classification purposes (Fire growth rate)
<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 [compliance parameter]
<i>PCS</i>	gross calorific potential [MJ/kg or MJ/m <sup>2</sup> ] (Gross calorific potential)
<i>PCI</i>	net calorific potential [MJ/kg or MJ/m <sup>2</sup> ]
<i>SMOGRA</i>	smoke growth rate [m <sup>2</sup> /s <sup>2</sup> ]
$t_f$	duration of sustained flaming [s] (duration of flaming)
<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 and linear pipe thermal insulation products;
- 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 an 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 or the extended application process 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 and field of application rules

### 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.

Direct and extended application shall be carried out as described in CEN/TS 15117 and in EN 15725.

### 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 burned, 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, F, B<sub>fl</sub>, C<sub>fl</sub>, D<sub>fl</sub>, E<sub>fl</sub>, F<sub>fl</sub>, B<sub>L</sub>, C<sub>L</sub>, D<sub>L</sub>, E<sub>L</sub> and F<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, specimen preparation and field of application**

### **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. Rules for direct and extended application of test results may influence the choice of the specific specimen preparation and/or details of test arrangements, so as to cover an envisaged field of application of test results.

### **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 will 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.

## 6.4 Field of application

Field of application can be defined using test reports and other relevant data, in accordance with the procedures specified in EN 15725, which e.g. describes the role of extended application in the classification process.

## 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  $LFS$ ,  $F_s$  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.

**7.6** Extended application results, obtained in accordance with the relevant extended application rules, are considered equivalent to test results. They are used in exactly the same way as test results for the classification of the product and building element. A classification report within the field of extended application shall include the extended application results, which appear from the extended application report.

## **8 Testing of construction products, excluding floorings and linear pipe thermal insulation products (see Table 1)**

### **8.1 Class E, F**

A product applying for class E or F 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>, F<sub>f</sub>

A product applying for class E<sub>f</sub> or F<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>, F<sub>L</sub>

A product applying for class E<sub>L</sub> or F<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*<sub>0,2MJ</sub> should first be used to determine whether the requirement for class A2<sub>L</sub> or B<sub>L</sub> or C<sub>L</sub> is met and if it is not, *FIGRA*<sub>0,4MJ</sub> should be used to determine whether class D<sub>L</sub> is met.

### 10.3 Classes A2<sub>L</sub>, A1<sub>L</sub>

#### 10.3.1 Homogenous products

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

A product applying for class A2<sub>L</sub> 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 A1<sub>L</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>L</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.

### 10.3.3 Class A2<sub>L</sub> products

Additionally, all products applying for class A2<sub>L</sub> shall be tested in accordance with EN 13823.

### 10.4 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.

### 10.5 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<sub>L</sub> in EN ISO 11925-2 (d2);
- for classes B<sub>L</sub>, C<sub>L</sub> and D<sub>L</sub> in EN ISO 11925-2 and EN 13823 (d0, d1 or d2);
- for class A2<sub>L</sub> 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	<i>PCS</i> and possibly <i>PCI</i>	
EN 13823	<i>FIGRA</i> <sub>0,2MJ</sub>	and <i>FIGRA</i> <sub>0,4MJ</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 *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**

Class F applies if a product fails to obtain class E when tested to 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 a 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.

If two samples fail to obtain class E when tested according to EN ISO 11925-2 the test series can be terminated and a classification to Class F can be given.

### **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.

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

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

## 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

$$\Delta T \leq 50 \text{ °C and}$$

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

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

## EN 13501-1:2018 (E)

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 1716:2010, 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

$$\Delta T \leq 30 \text{ }^\circ\text{C and}$$

$$\Delta m \leq 50 \%$$

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

#### 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

$\Delta T \leq 30 \text{ }^\circ\text{C}$  and

$\Delta m \leq 50 \%$  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 1716:2010, 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:

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

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

**11.9.3 s2**

EN 13823

The product shall satisfy all of the following criteria:

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

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

**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.

**11.10.3 Product classified F**

The d classification is not applicable for class F.

## 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  $F_s$ .

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

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

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

Under condition of surface flame attack with 15 s exposure time, there shall be a 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.

If two samples fail to obtain class E when tested according to EN ISO 11925-2 the test series can be terminated and a classification to Class F<sub>n</sub> can be given.

### 12.3 Class E<sub>n</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 or equal to 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>n</sub>

The product shall satisfy all of the following criteria:

#### a) EN ISO 11925-2

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

#### b) EN ISO 9239-1

Critical heat flux  $\geq 3,0$  kW/m<sup>2</sup>.

### **12.5 Class C<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  $\geq 4,5$  kW/m<sup>2</sup>.

### **12.6 Class B<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  $\geq 8,0$  kW/m<sup>2</sup>.

### **12.7 Class A2<sub>fl</sub>**

#### **12.7.1 General**

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

EN ISO 9239-1

Critical heat flux  $\geq 8,0$  kW/m<sup>2</sup>.

#### **12.7.2 Homogeneous products**

The product shall satisfy the following criteria:

- a) EN ISO 1716

$PCS \leq 3,0$  MJ/kg

or

- b) EN ISO 1182

$\Delta T \leq 50$  °C and

$\Delta m \leq 50$  % and

$t_f \leq 20$  s.

#### **12.7.3 Non-homogeneous products**

Each substantial component shall satisfy the following criteria:

- a) EN ISO 1716

$PCS \leq 3,0$  MJ/kg

or

b) EN ISO 1182

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

$\Delta m \leq 50 \%$  and

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

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

$\Delta T \leq 30 \text{ }^\circ\text{C}$  and

$\Delta m \leq 50 \%$  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

## EN 13501-1:2018 (E)

b) EN ISO 1182

$\Delta T \leq 30 \text{ }^\circ\text{C}$  and

$\Delta m \leq 50 \%$  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 A2<sub>fl</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:

Smoke  $\leq 750 \%$  x 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>

Class F<sub>L</sub> applies if a product fails to obtain class E<sub>L</sub> when tested to 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 a 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.

If two samples fail to obtain class E when tested according to EN ISO 11925-2 the test series can be terminated and a classification to Class F<sub>L</sub> can be given.

### 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 or equal to 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 or equal to 150 mm from the point of application of the test flame within 60 s from the time of application.

— EN 13823

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

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

### **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 or equal to 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.

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

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

### **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 or equal to 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.

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

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

### **13.7 Class A<sub>2L</sub>**

#### **13.7.1 General**

When tested in accordance with EN 13823 every class A<sub>2L</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:

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 1716:2010, 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 1716:2010, 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:

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

### 13.10.3 Product classified F<sub>L</sub>

The d classification is not applicable for class F<sub>L</sub>.

## 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:

A1<sub>f</sub>

A2<sub>f</sub>-s1                      A2<sub>f</sub>-s2

B<sub>f</sub>-s1                      B<sub>f</sub>-s2

C<sub>f</sub>-s1                      C<sub>f</sub>-s2

D<sub>f</sub>-s1                      D<sub>f</sub>-s2

E<sub>f</sub>

F<sub>f</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</sub> -s1, d0	A <sub>2L</sub> -s1, d1	A <sub>2L</sub> -s1, d2
A <sub>2L</sub> -s2, d0	A <sub>2L</sub> -s2, d1	A <sub>2L</sub> -s2, d2
A <sub>2L</sub> -s3, d0	A <sub>2L</sub> -s3, d1	A <sub>2L</sub> -s3, d2
B <sub>L</sub> -s1, d0	B <sub>L</sub> -s1, d1	B <sub>L</sub> -s1, d2
B <sub>L</sub> -s2, d0	B <sub>L</sub> -s2, d1	B <sub>L</sub> -s2, d2
B <sub>L</sub> -s3, d0	B <sub>L</sub> -s3, d1	B <sub>L</sub> -s3, d2
C <sub>L</sub> -s1, d0	C <sub>L</sub> -s1, d1	C <sub>L</sub> -s1, d2
C <sub>L</sub> -s2, d0	C <sub>L</sub> -s2, d1	C <sub>L</sub> -s2, d2
C <sub>L</sub> -s3, d0	C <sub>L</sub> -s3, d1	C <sub>L</sub> -s3, d2
D <sub>L</sub> -s1, d0	D <sub>L</sub> -s1, d1	D <sub>L</sub> -s1, d2
D <sub>L</sub> -s2, d0	D <sub>L</sub> -s2, d1	D <sub>L</sub> -s2, d2
D <sub>L</sub> -s3, d0	D <sub>L</sub> -s3, d1	D <sub>L</sub> -s3, d2

E<sub>L</sub>

E<sub>L</sub>-d2

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) and/or from the extended application process. 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, or for which the field of application is extended in an extended application report.

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, or based on the outcome of an extended application process.

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 or in the extended application report(s) 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) each test report or extended application report used in support of this classification is identified by:
    - i) the name of the laboratory carrying out the tests or preparing the extended application report;
    - ii) the name of the sponsor;

- iii) the test report and/or extended application report identification number;
  - 2) identification of the tests and/or extended application reports carried out in accordance with the standard and the envisaged field of application;
  - 3) summary of test results for each specimen tested and or extended application results;
- 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 application, i.e. the end use conditions of this classification report;
- h) additional statements;
- 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.

**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> and	$\Delta T \leq 30 \text{ }^\circ\text{C}$ ; and $\Delta m \leq 50 \%$ ; and $t_f = 0 \text{ s}$ (i.e. no sustained flaming)	-
	EN ISO 1716	$PCS \leq 2,0 \text{ MJ/kg}$ <sup>a</sup> and $PCS \leq 2,0 \text{ MJ/kg}$ <sup>b c</sup> and $PCS \leq 1,4 \text{ MJ/m}^2$ <sup>d</sup> and $PCS \leq 2,0 \text{ MJ/kg}$ <sup>e</sup>	-
<b>A2</b>	EN ISO 1182 <sup>a</sup> or	$\Delta T \leq 50 \text{ }^\circ\text{C}$ ; and $\Delta m \leq 50 \%$ ; and $t_f \leq 20 \text{ s}$	-
	EN ISO 1716 and	$PCS \leq 3,0 \text{ MJ/kg}$ <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>d</sup> and $PCS \leq 3,0 \text{ MJ/kg}$ <sup>e</sup>	-
	EN 13823	$FIGRA_{0,2 \text{ MJ}} \leq 120 \text{ W/s}$ and $LFS < \text{edge of specimen}$ and $THR_{600s} \leq 7,5 \text{ MJ}$	Smoke production <sup>f</sup> and Flaming droplets/particles <sup>g</sup>

Class	Test method(s)	Classification criteria	Additional classification
<b>B</b>	EN 13823 and	$FIGRA_{0,2 MJ} \leq 120 \text{ W/s}$ and $LFS < \text{edge of specimen}$ and $THR_{600s} \leq 7,5 \text{ MJ}$	Smoke production <sup>f</sup> and Flaming droplets/particles <sup>g</sup>
	EN ISO 11925-2 <sup>i</sup> : Exposure = 30 s	$F_s \leq 150 \text{ mm}$ within 60 s	
<b>C</b>	EN 13823 and	$FIGRA_{0,4 MJ} \leq 250 \text{ W/s}$ and $LFS < \text{edge of specimen}$ and $THR_{600s} \leq 15 \text{ MJ}$	Smoke production <sup>f</sup> and Flaming droplets/particles <sup>g</sup>
	EN ISO 11925-2 <sup>i</sup> : Exposure = 30 s	$F_s \leq 150\text{mm}$ within 60 s	
<b>D</b>	EN 13823 and	$FIGRA_{0,4 MJ} \leq 750 \text{ W/s}$	Smoke production <sup>f</sup> and Flaming droplets/particles <sup>g</sup>
	EN ISO 11925-2 <sup>i</sup> : Exposure = 30 s	$F_s \leq 150 \text{ mm}$ within 60 s	
<b>E</b>	EN ISO 11925-2 <sup>i</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	Flaming droplets/particles <sup>h</sup>
<b>F</b>	EN ISO 11925-2 <sup>i</sup> : Exposure = 15 s	$F_s > 150 \text{ mm}$ within 20 s	

<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> **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>fl</sub></b>	EN ISO 1182 <sup>a</sup> and	$\Delta T \leq 30 \text{ }^\circ\text{C}$ ; and $\Delta m \leq 50 \%$ ; and $t_f = 0 \text{ s}$ (i.e. no sustained flaming)	-
	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>fl</sub></b>	EN ISO 1182 <sup>a</sup> or	$\Delta T \leq 50 \text{ }^\circ\text{C}$ and $\Delta m \leq 50 \%$ and $t_f \leq 20 \text{ s}$	-
	EN ISO 1716 and	$PCS \leq 3,0 \text{ MJ/kg}$ <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 <sup>f</sup> $\geq 8,0 \text{ kW/m}^2$	Smoke production <sup>g</sup>
<b>B<sub>fl</sub></b>	EN ISO 9239-1 <sup>e</sup> and	Critical flux <sup>f</sup> $\geq 8,0 \text{ kW/m}^2$	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>fl</sub></b>	EN ISO 9239-1 <sup>e</sup> and	Critical flux <sup>f</sup> $\geq 4,5 \text{ kW/m}^2$	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>fl</sub></b>	EN ISO 9239-1 <sup>e</sup> and	Critical flux <sup>f</sup> $\geq 3,0 \text{ kW/m}^2$	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>fl</sub></b>	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
<b>F<sub>fl</sub></b>	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s > 150 \text{ mm}$ within 20 s	

<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> Test duration = 30 min.

<sup>f</sup> 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).

<sup>g</sup> **s1** = Smoke  $\leq 750 \%$  min;

**s2** = not s1.

<sup>h</sup> 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**

<b>Class</b>	<b>Test method(s)</b>	<b>Classification criteria</b>	<b>Additional classification</b>
<b>A1<sub>L</sub></b>	EN ISO 1182 <sup>a</sup> and	$\Delta T \leq 30$ °C; and $\Delta m \leq 50$ %; and $t_f = 0$ s (i.e. no sustained flaming)	-
	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> or	$\Delta T \leq 50$ °C; and $\Delta m \leq 50$ %; and $t_f \leq 20$ s	-
	EN ISO 1716 and	$PCS \leq 3,0$ 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>	-
	EN 13823	$FIGRA_{0,2 MJ} \leq 270$ 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 and	$FIGRA_{0,2 MJ} \leq 270$ 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>
	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 and	$FIGRA_{0,2 MJ} \leq 460$ 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>
	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 and	$FIGRA_{0,4 MJ} \leq 2\ 100$ W/s $THR_{600s} \leq 100$ MJ	Smoke production <sup>e</sup> and Flaming droplets/particles <sup>f</sup>
	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>	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s > 150$ mm within 20 s	

- <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** =  $SMOGRA \leq 105 \text{ m}^2/\text{s}^2$  and  $TSP_{600\text{s}} \leq 250 \text{ m}^2$ ; **s2** =  $SMOGRA \leq 580 \text{ m}^2/\text{s}^2$  and  $TSP_{600\text{s}} \leq 1\,600 \text{ m}^2$ ;  
**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 delegated regulation 2016/364 on classification of reaction to fire performance of construction products pursuant to regulation N°305/2011 of the European parliament and of the Council

#### 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 Delegated Regulation 2016/364 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 Delegated Regulation.

**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. Figure A.2 gives an informative illustration of the relationship between  $FIGRA_{0,2Mj}$  and  $FIGRA_{0,4Mj}$  and the classes.

**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 Figure A.1.

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

Class F, F <sub>L</sub> :	Products 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

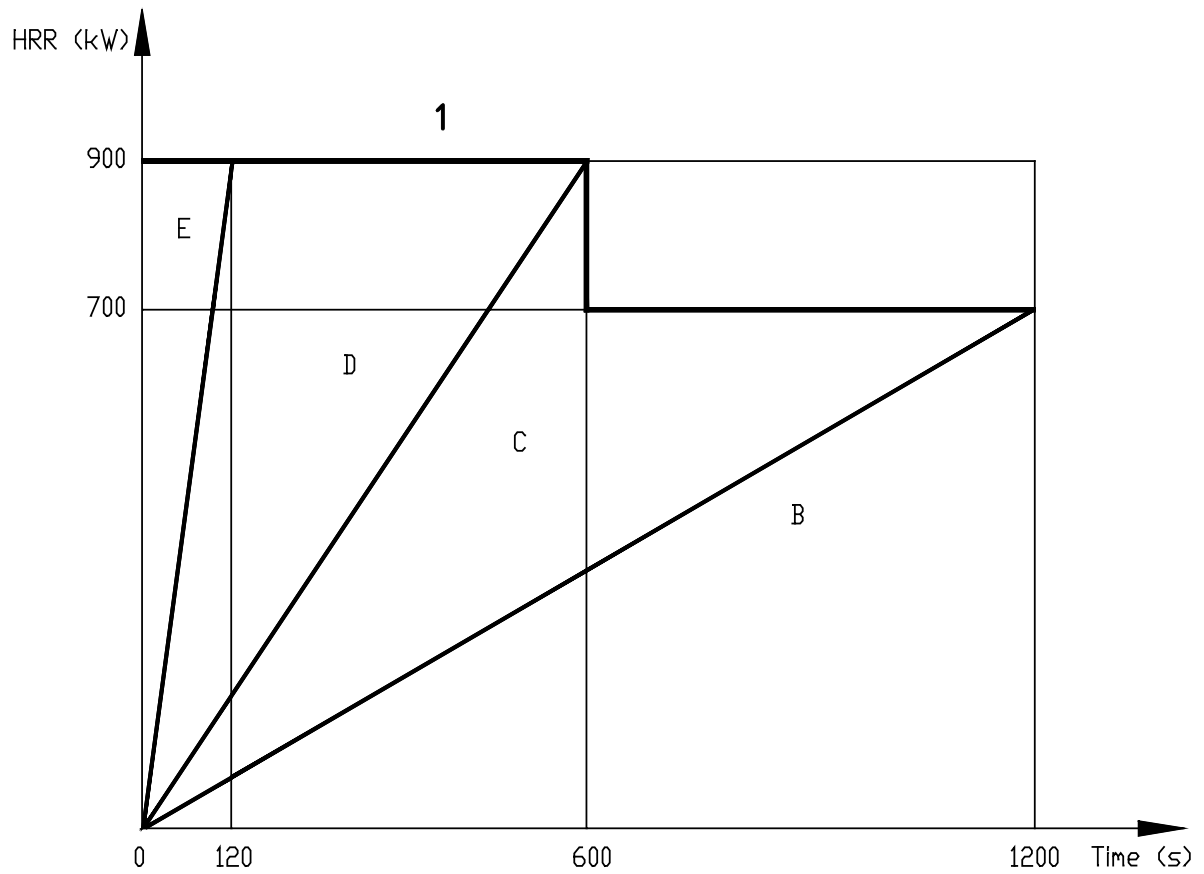
d2	No limitation
d1	No flaming droplets/particles persisting longer than a given time occurred
d0	No flaming droplets/particles occurred

### A.4.3 For floorings

Class F <sub>fl</sub> :	Products which cannot be classified in one of the classes A1 <sub>fl</sub> , A2 <sub>fl</sub> , B <sub>fl</sub> , C <sub>fl</sub> , D <sub>fl</sub> , E <sub>fl</sub> .
Class E <sub>fl</sub> :	Products capable of resisting a small flame.
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:

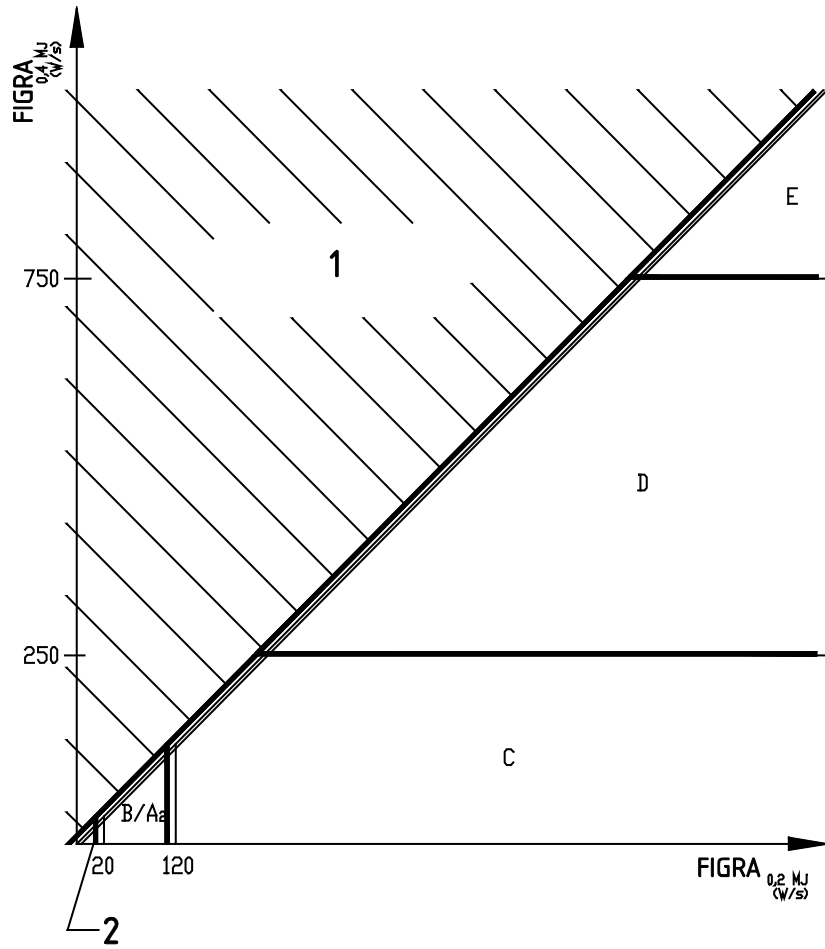
s2	No limit;
s1	The total smoke production is limited.

**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

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

#### B.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 13501-1:2018

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 13501-1:2018

**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\**

Test performed at: *name & address where the test was performed\*\**

**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*

\*\* *To be used only for CE marking when applying article 46 of the CPR*

#### B.2 Details of classified product

##### B.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

##### B.2.2 Product description

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

Product description:

*Insert product description here.*

(Use tabulated data templates wherever possible)

**B.3 Reports and results in support of this classification****B.3.1 Specific conditions(\*\*)**

The tests were performed using facilities outside the testing laboratory of the notified body in application of article 46 of the Construction Product Regulation (305/2011).

*Name of Notified Body*, upon request of the manufacturer decided to carry out the tests, referred to in the present report, outside the testing laboratory. The justification of the decision is justified by [technical, economic or logistic reasons]<sup>+</sup>

**\*\***: To be used only for CE marking when applying article 46 of the CPR

**+** : To be specified by the author of the report.

**B.3.2 Reports**

Enter details of reports here as applicable

<b>Name of Laboratory</b>	<b>Name of sponsor</b>	<b>Report ref. no.</b>	<b>Test method and date Field of application rules and date</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>

**B.3.3 Results**

<b>Test method and test number</b>	<b>Parameter</b>	<b>No. Tests<sup>a</sup></b>	<b>Results</b>	
			<b>Continuous parameter - mean (m)</b>	<b>Compliance with parameters</b>
<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>

<sup>a</sup> Not for extended application.

## B.4 Classification and field of application

### B.4.1 Reference of classification

This classification has been carried out in accordance with EN 13501-1:2018.

### B.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>f</sub> to F<sub>f</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:

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

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:

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

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:

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

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*

**B.4.3 Field of application**

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

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

**B.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 Assessment and verification of constancy of performance (AVCP) 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 of AVCP and CE marking under the Regulation 305/2011/EU of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products.

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

.....

## Bibliography

- [1] EN 13238, *Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates*
- [2] EN ISO 13943, *Fire safety - Vocabulary (ISO 13943)*
- [3] CEN/TS 15447, *Mounting and fixing in reaction to fire tests under the Construction Products Directive*
- [4] ISO 9705:1993, *Fire tests - Full-scale room test for surface products*
- [5] ISO/TR 9705-2:2001, *Reaction-to-fire tests - Full-scale room tests for surface products - Part 2: Technical background and guidance*
- [6] EN 14390:2007, *Fire test - Large-scale room reference test for surface products*