

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

WITHDRAWN

ICS 13.220.50



National foreword

This British Standard is the official English language version of EN 13501-1:2002.

The UK participation in its preparation was entrusted by Technical Committee FSH/21, Reaction to fire tests, to Subcommittee FSH/21/8, Application of test results, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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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 15 November 2001.

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by July 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex A, which is an integral part of this document.

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 components of normal service installations (other than smoke control systems);

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 roof tests.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland 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.

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

Background information on the Commission Decision 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 of 4 October 1996 establishing the list of products belonging to Classes A1 and A1_{fl} "No contribution to fire" provided for in Decision 96/603/EEC.

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

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

1 Scope

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

Products are considered in relation to their end use application.

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

- construction products, excluding floorings;
- floorings.

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

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

prEN ISO 1182, *Reaction to fire tests for building products — Non-combustibility test (ISO/FDIS 1182:2000)*.

prEN ISO 1716:1998, *Reaction to fire tests for building products — Determination of the gross calorific value (ISO/DIS 1716:1998)*.

prEN ISO 9239-1, *Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source (ISO/FDIS 9239-1:2000)*.

prEN ISO 11925-2, *Reaction to fire tests for building products — Part 2: Ignitability when subjected to direct impingement of flame (ISO/DIS 11925-2:1999)*.

EN 13238, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates*.

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

EN ISO 13943, *Fire safety — Vocabulary (ISO 13943:2000)*.

3 Terms, definitions and symbols

3.1 Terms and definitions

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

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

3.1.1

product

material, element or component about which information is required

3.1.2

material

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

3.1.3

homogeneous product

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

3.1.4

non-homogeneous product

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

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 at 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

substrate

product which is used immediately beneath the product about which information is required. For flooring, it is the floor on which it is mounted or the material that represents this floor

3.1.11

standard substrate

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

3.1.12

end use application

real application of a product, in relation to all aspects that influence the behaviour of that product under different fire situations. It covers aspects such as its quantity, orientation, position in relation to other adjacent products, and its method of fixing

3.1.13

fire performance

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

3.1.14

reaction to fire

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

3.1.15

fire scenario

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

3.1.16

reference scenario

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

3.1.17

fire situation

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

3.1.18

combustion

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

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

3.1.19

calorific value

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

NOTE It is expressed in joules per kilogram.

3.1.20

gross calorific potential

calorific value of a material when the combustion is complete and any produced water is entirely condensed

3.1.21

contribution to fire

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

3.1.22

ignitability

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

3.1.23

heat release

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

3.1.24

small fire attack

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

3.1.25**level of exposure**

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

3.1.26**flame spread**

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

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

3.1.27**sustained flaming**

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

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

3.1.28**fully developed fire**

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

3.1.29**flashover**

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

3.1.30**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

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

incident heat flux (kW/m^2) at the surface of a specimen at the point where the flame ceases to advance and may subsequently go out. The heat flux value reported is based on interpolations of measurements with a non-combustible calibration board

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

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

3.1.33**critical flux (*CF*)**

the radiant flux at which the flame extinguishes (*CHF*) or the radiant flux after a test period of 30 min (*HF-30*), whichever is the lower (i.e. the flux corresponding with the furthest extent of spread of flame)

3.1.34**smoke hazard**

potential for injury and/or damage from smoke

3.1.35**FIGRA**

fire growth rate index used for classification purposes

For the Classes A2 and B, $FIGRA = FIGRA_{0,2 \text{ MJ}}$.

For the Classes C and D, $FIGRA = FIGRA_{0,4 \text{ MJ}}$.

3.1.36

FIGRA_{0,2MJ}

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

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

3.1.37

FIGRA_{0,4MJ}

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

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

3.1.38

SMOGRA

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

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

3.2 Symbols and abbreviations

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

ΔT	temperature rise (K)
Δm	mass loss (%)
F_s	flame spread (mm)
<i>FIGRA</i>	fire growth rate index used for classification purposes
<i>FIGRA_{0,2MJ}</i>	fire growth rate index at <i>THR</i> threshold of 0,2 MJ
<i>FIGRA_{0,4MJ}</i>	fire growth rate index at <i>THR</i> threshold of 0,4 MJ
<i>LFS</i>	lateral flame spread (<i>m</i>)
<i>PCS</i>	gross calorific potential (MJ/kg or MJ/m ²)
<i>PCI</i>	net calorific potential (MJ/kg or MJ/m ²)
<i>SMOGRA</i>	smoke growth rate
t_f	duration of sustained flaming (s)
<i>THR_{600s}</i>	total heat release within 600 s (MJ)
<i>TSP_{600s}</i>	total smoke production within 600 s (m ²)
$\bar{}$	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
\bar{m}	mean value of the set of results of a continuous parameter determined in accordance with the procedure in 7.3 and used for classification

4 Classes of reaction to fire performance

The classes with their corresponding fire performance are given in:

- Table 1 for construction products excluding floorings;
- Table 2 for floorings.

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

5 Test methods

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

5.1 Non-combustibility test (prEN 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_n and A2_n.

5.2 Calorific potential test (prEN ISO 1716)

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

The test is relevant for the Classes A1, A2, A1_n and A2_n.

It allows the determination of both the gross calorific potential (*PCS*) and the net calorific potential (*PCI*).

5.3 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, B, C and D. Under the conditions specified in 8.3.2 the test is also relevant for the Class A1.

5.4 Ignitability test (prEN ISO 11925-2)

This test evaluates the ignitability of a product under exposure to a small flame. The test is relevant for the Classes B, C, D, E, B_n, C_n, D_n and E_n.

5.5 Determination of the burning behaviour of floorings, using a radiant heat source (prEN 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_n, B_n, C_n and D_n.

6 Principles for testing and specimen preparation

6.1 General requirements for specimen preparation

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

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6.2 Specific requirements for non-combustibility and calorific potential testing

Non-combustibility and calorific potential are product characteristics and are thus independent of the end use of the product.

For homogeneous products they are determined directly.

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

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

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

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

This end use application mainly includes the following aspects:

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

Typical orientations are:

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

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

Floorings shall be tested horizontally with the exposed face upwards according to prEN ISO 9239-1, and vertically according to prEN 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 (prEN ISO 11925-2), products are tested with surface flame attack only if in the envisaged end use application direct flame attack on the edge cannot occur. This is the case for floorings. If edges can be exposed under end use conditions, both surface and edge flame attacks are applied.

7 Number of tests for classification

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

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

7.3 For each continuous parameter (ΔT , Δm , 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:

- a) 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.

- b) 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.a) and 7.4.b).

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

8.1 Class E

A product applying for Class E shall be tested in accordance with prEN 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 prEN ISO 11925-2 with 30 s exposure time.

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

$FIGRA_{0,2MJ}$ should first be used to determine whether the requirement for Class A2 or B is met and if it is not, $FIGRA_{0,4MJ}$ should 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 prEN ISO 1182 and prEN ISO 1716.

A product applying for Class A2 shall be tested in accordance with either prEN ISO 1182 or prEN 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 prEN ISO 1182 and prEN ISO 1716. Additionally, any product with an external non-substantial component, having a $PCS > 2,0 \text{ MJ/kg}$ and a $PCS \leq 2,0 \text{ MJ/m}^2$, shall be tested in accordance with EN 13823 (see Table 1, note 2a, *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 prEN ISO 1182 or prEN ISO 1716. The non-substantial components of a non-homogeneous product shall be tested separately in accordance with prEN 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 prEN ISO 11925-2 (d2);
- for Classes B, C and D in prEN 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_{fl}

A product applying for Class E_{fl} shall be tested in accordance with prEN ISO 11925-2 with 15 s exposure time.

9.2 Classes D_{fl}, C_{fl}, B_{fl}

A product applying for one of the Classes D_{fl}, C_{fl}, or B_{fl} shall be tested in accordance with prEN ISO 9239-1 and prEN ISO 11925-2 with 15 s exposure time.

9.3 Classes A2_{fl}, A1_{fl}

9.3.1 Homogeneous products

A product applying for Class A1_{fl} shall be tested in accordance with prEN ISO 1182 and prEN ISO 1716.

A product applying for Class A2_{fl} shall be tested in accordance with prEN ISO 9239-1, and either prEN ISO 1182 or prEN ISO 1716.

9.3.2 Non-homogeneous products

Each substantial component of a non-homogeneous product applying for Class A1_{fl} shall be tested separately in accordance with prEN ISO 1182 and prEN ISO 1716.

Each substantial component of a non-homogeneous product applying for Class A2_{fl} shall be tested separately in accordance with either prEN ISO 1182 or prEN ISO 1716. The non-substantial components of a non-homogeneous product shall be tested separately in accordance with prEN ISO 1716 only.

9.3.3 Class A2_{fl} products

Additionally, all products applying for Class A2_{fl} shall be tested in accordance with prEN 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 prEN ISO 9239-1.

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

10.1 General

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

a) continuous parameters

prEN ISO 1182	ΔT Δm t_f
prEN ISO 1716	PCS and possibly PCI
EN 13823	FIGRA _{0,2 MJ} and FIGRA _{0,4 MJ} THR _{600s} SMOGR TSP _{600s}

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

b) compliance parameters

EN 13823	LFS and flaming droplets/particles
prEN 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.

10.2 Class F

No performance criteria.

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

10.3 Class E

The product shall satisfy the following criteria:

prEN 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.

10.4 Class D

The product shall satisfy all of the following criteria:

a) **prEN 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**

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

10.5 Class C

The product shall satisfy all of the following criteria:

a) **prEN 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.

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

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

10.6 Class B

The product shall satisfy all of the following criteria:

a) **prEN 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.

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

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

10.7 Class A2

10.7.1 General

When tested in accordance with EN 13823 every Class A2 product shall satisfy the same criteria as for Class B (see 10.6).

EN 13501-1:2002 (E)

10.7.2 Homogeneous products

The product shall satisfy the following criteria:

a) **prEN ISO 1716**

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

or

b) **prEN ISO 1182**

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

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

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

10.7.3 Non-homogeneous products

Each substantial component shall satisfy the following criteria:

a) **prEN ISO 1716**

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

or

b) **prEN ISO 1182**

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

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

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

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

prEN ISO 1716

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

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

prEN ISO 1716

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

The product as a whole shall satisfy the following criterion:

prEN 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 prEN ISO 1716:1998, 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.

10.8 Class A1

10.8.1 Homogeneous products

The product shall satisfy all of the following criteria:

a) **prEN ISO 1716**

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

and

b) **prEN ISO 1182**

$$\Delta T \leq 30 \text{ °C and}$$

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

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

10.8.2 Non-homogeneous products

Each substantial component shall satisfy all of the following criteria:

a) **prEN ISO 1716**

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

and

b) **prEN ISO 1182**

$$\Delta T \leq 30 \text{ °C and}$$

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

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

EN 13501-1:2002 (E)

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

a) **prEN ISO 1716**

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

or

b) **prEN ISO 1716**

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

and

EN 13823

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

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

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

satisfy the conditions for s1 and d0

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

prEN ISO 1716

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

The product as a whole shall satisfy the following criterion:

prEN 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 prEN ISO 1716:1998, 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.

10.9 Additional classifications s1, s2, s3 for smoke production

10.9.1 General

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

10.9.2 s1

EN 13823

The product shall satisfy all of the following criteria:

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

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

10.9.3 s2

EN 13823

The product shall satisfy all of the following criteria:

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

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

10.9.4 s3

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

10.10 Additional classifications d0, d1, d2 for flaming droplets and/or particles

10.10.1 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 (prEN ISO 11925-2).

10.10.2 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 Classification criteria for floorings (see Table 2)

11.1 General

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

a) continuous parameters

prEN ISO 1182	ΔT Δm t_f
prEN ISO 1716	PCS
prEN 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.

EN 13501-1:2002 (E)

- b) compliance parameter

prEN ISO 11925-2 F_s

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

11.2 Class F_n

No performance criteria.

11.3 Class E_n

The product shall satisfy the following criterion:

prEN ISO 11925-2

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

11.4 Class D_n

The product shall satisfy all of the following criteria:

- a) prEN ISO 11925-2

The product shall pass the E_n criterion.

- b) prEN ISO 9239-1

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

11.5 Class C_n

The product shall satisfy all of the following criteria:

- a) prEN ISO 11925-2

The product shall pass the E_n criterion.

- b) prEN ISO 9239-1

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

11.6 Class B_n

The product shall satisfy all of the following criteria:

- a) prEN ISO 11925-2

The product shall pass the E_n criterion.

- b) prEN ISO 9239-1

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

11.6.1 General

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

prEN ISO 9239-1

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

11.6.2 Homogeneous products

The product shall satisfy the following criteria:

a) **prEN ISO 1716**

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

or

b) **prEN ISO 1182**

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

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

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

11.6.3 Non-homogeneous products

Each substantial component shall satisfy the following criteria:

a) **prEN ISO 1716**

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

or

b) **prEN ISO 1182**

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

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

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

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

prEN ISO 1716

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

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

prEN ISO 1716

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

EN 13501-1:2002 (E)

The product as a whole shall satisfy the following criterion:

prEN ISO 1716

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

11.8 Class A1_n

11.8.1 Homogeneous products

The product shall satisfy the following criteria:

a) **prEN ISO 1716**

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

and

b) **prEN ISO 1182**

$$\Delta T \leq 30 \text{ °C and}$$

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

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

11.8.2 Non-homogeneous products

Each substantial component shall satisfy the following criteria:

a) **prEN ISO 1716**

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

and

b) **prEN ISO 1182**

$$\Delta T \leq 30 \text{ °C and}$$

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

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

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

prEN ISO 1716

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

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

prEN ISO 1716

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

The product as a whole shall satisfy the following criterion:

prEN ISO 1716

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

11.9 Additional classifications s1, s2 for smoke production

11.9.1 General

Products classified A2_n, B_n, C_n, and D_n obtain an additional classification of s1 or s2 regarding the smoke production.

11.9.2 s1

prEN ISO 9239-1

The product shall satisfy the following criterion:

$$\text{Smoke} \leq 750 \% \times \text{min}$$

11.9.3 s2

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

12 Presentation of classification

12.1 Construction products, excluding floorings

The following classes for construction products, excluding floorings, are covered by this 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.

12.2 Floorings

The following classes for floorings are covered by this standard:

A1_f

A2 _f -s1	A2 _f -s2
B _f -s1	B _f -s2
C _f -s1	C _f -s2
D _f -s1	D _f -s2

E_f

F_f

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

13 Field of application of the classification

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

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

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

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

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

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

NOTE Rules for direct and extended application are under development.

14 Classification report

14.1 General

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

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

14.2 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 organization issuing the classification report;
- d) details of the nature and use of the product under classification, including its commercial name(s);
- e) detailed description of the product;

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

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

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

The classification report shall include:

 - 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

Class	Test method(s)	Classification criteria	Additional classification
A1	prEN ISO 1182 ⁽¹⁾ and	$\Delta T \leq 30$ °C; and $\Delta m \leq 50$ %; and $t_f = 0$ (i.e. no sustained flaming)	—
	prEN ISO 1716	$PCS \leq 2,0$ MJ/kg ⁽¹⁾ and $PCS \leq 2,0$ MJ/kg ^{(2) (2a)} and $PCS \leq 1,4$ MJ/m ² ⁽³⁾ and $PCS \leq 2,0$ MJ/kg ⁽⁴⁾	—
A2	prEN ISO 1182 ⁽¹⁾ or	$\Delta T \leq 50$ °C; and $\Delta m \leq 50$ %; and $t_f \leq 20$ s	—
	prEN ISO 1716 and	$PCS \leq 3,0$ MJ/kg ⁽¹⁾ and $PCS \leq 4,0$ MJ/m ² ⁽²⁾ and $PCS \leq 4,0$ MJ/m ² ⁽³⁾ and $PCS \leq 3,0$ MJ/kg ⁽⁴⁾	—
	EN 13823	$FIGRA \leq 120$ W/s and $LFS < \text{edge of specimen}$ and $THR_{600s} \leq 7,5$ MJ	Smoke production ⁽⁵⁾ and Flaming droplets/particles ⁽⁶⁾
B	EN 13823 and	$FIGRA \leq 120$ W/s and $LFS < \text{edge of specimen}$ and $THR_{600s} \leq 7,5$ MJ	Smoke production ⁽⁵⁾ and Flaming droplets/particles ⁽⁶⁾
	prEN ISO 11925-2 ⁽⁸⁾ : Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
C	EN 13823 and	$FIGRA \leq 250$ W/s and $LFS < \text{edge of specimen}$ and $THR_{600s} \leq 15$ MJ	Smoke production ⁽⁵⁾ and Flaming droplets/particles ⁽⁶⁾
	prEN ISO 11925-2 ⁽⁸⁾ : Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
D	EN 13823 and	$FIGRA \leq 750$ W/s	Smoke production ⁽⁵⁾ and Flaming droplets/particles ⁽⁶⁾
	prEN ISO 11925-2 ⁽⁸⁾ : Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
E	prEN ISO 11925-2 ⁽⁸⁾ : Exposure = 15 s	$F_s \leq 150$ mm within 20 s	Flaming droplets/particles ⁽⁷⁾
F	No performance determined		
<p>(1) For homogeneous products and substantial components of non-homogeneous products.</p> <p>(2) For any external non-substantial component of non-homogeneous products.</p> <p>(2a) Alternatively, any external non-substantial component having a $PCS \leq 2,0$ MJ/m², provided that the product satisfies the following criteria of EN 13823: $FIGRA \leq 20$ W/s, and $LFS < \text{edge of specimen}$, and $THR_{600s} \leq 4,0$ MJ, and s1, and d0.</p> <p>(3) For any internal non-substantial component of non-homogeneous products.</p> <p>(4) For the product as a whole.</p> <p>(5) In the last phase of the development of the test procedure, modifications of the smoke measurement system have been introduced, the effect of which needs further investigation. This may result in a modification of the limit values and/or parameters for the evaluation of the smoke production. s1 = $SMOGRA \leq 30\text{m}^2/\text{s}^2$ and $TSP_{600s} \leq 50\text{m}^2$; s2 = $SMOGRA \leq 180\text{m}^2/\text{s}^2$ and $TSP_{600s} \leq 200\text{m}^2$; s3 = not s1 or s2.</p> <p>(6) 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 prEN ISO 11925-2 results in a d2 classification.</p> <p>(7) Pass = no ignition of the paper (no classification); Fail = ignition of the paper (d2 classification).</p> <p>(8) Under conditions of surface flame attack and, if appropriate to the end-use application of the product, edge flame attack.</p>			

Table 2 — Classes of reaction to fire performance for floorings

Class	Test method(s)	Classification criteria	Additional classifications
A1_n	prEN ISO 1182 ⁽¹⁾ and	$\Delta T \leq 30\text{ }^{\circ}\text{C}$; and $\Delta m \leq 50\text{ \%}$; and $t_f = 0$ (i.e. no sustained flaming)	—
	prEN ISO 1716	$PCS \leq 2,0\text{ MJ/kg}$ ⁽¹⁾ and $PCS \leq 2,0\text{ MJ/kg}$ ⁽²⁾ and $PCS \leq 1,4\text{ MJ/m}^2$ ⁽³⁾ and $PCS \leq 2,0\text{ MJ/kg}$ ⁽⁴⁾	—
A2_n	prEN ISO 1182 ⁽¹⁾ or	$\Delta T \leq 50\text{ }^{\circ}\text{C}$ and $\Delta m \leq 50\text{ \%}$ and $t_f \leq 20\text{ s}$	—
	prEN ISO 1716 and	$PCS \leq 3,0\text{ MJ/kg}$ ⁽¹⁾ and $PCS \leq 4,0\text{ MJ/m}^2$ ⁽²⁾ and $PCS \leq 4,0\text{ MJ/m}^2$ ⁽³⁾ and $PCS \leq 3,0\text{ MJ/kg}$ ⁽⁴⁾	—
	prEN ISO 9239-1 ⁽⁵⁾	Critical flux ⁽⁶⁾ $\geq 8,0\text{ kW/m}^2$	Smoke production ⁽⁷⁾
B_n	prEN ISO 9239-1 ⁽⁵⁾ and	Critical flux ⁽⁶⁾ $\geq 8,0\text{ kW/m}^2$	Smoke production ⁽⁷⁾
	prEN ISO 11925-2 ⁽⁸⁾ : Exposure = 15 s	$F_s \leq 150\text{ mm}$ within 20 s	—
C_n	prEN ISO 9239-1 ⁽⁵⁾ and	Critical flux ⁽⁶⁾ $\geq 4,5\text{ kW/m}^2$	Smoke production ⁽⁷⁾
	prEN ISO 11925-2 ⁽⁸⁾ : Exposure = 15 s	$F_s \leq 150\text{ mm}$ within 20 s	—
D_n	prEN ISO 9239-1 ⁽⁵⁾ and	Critical flux ⁽⁶⁾ $\geq 3,0\text{ kW/m}^2$	Smoke production ⁽⁷⁾
	prEN ISO 11925-2 ⁽⁸⁾ : Exposure = 15 s	$F_s \leq 150\text{ mm}$ within 20 s	—
E_n	prEN ISO 11925-2 ⁽⁸⁾ : Exposure = 15 s	$F_s \leq 150\text{ mm}$ within 20 s	—
F_n	No performance determined		
<p>(1) For homogeneous products and substantial components of non-homogeneous products.</p> <p>(2) For any external non-substantial component of non-homogeneous products.</p> <p>(3) For any internal non-substantial component of non-homogeneous products.</p> <p>(4) For the product as a whole.</p> <p>(5) Test duration = 30 min.</p> <p>(6) 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).</p> <p>(7) s1 = Smoke $\leq 750\%$ min; s2 = not s1.</p> <p>(8) Under conditions of surface flame attack and, if appropriate to the end use application of the product, edge flame attack.</p>			

Annex A

(informative)

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

A.1 General

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

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

A.2 Assumptions

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

The first stage includes initiation of the fire by ignition of a product, with a small flame, on a limited area of a product.

- a) 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.
- b) 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 and 2 is not appropriate, one or more reference scenarios can be called upon. Such scenarios can be described in a future European Standard or Commission Decision.

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

A.2.4 There is no unequivocal relationship between different behavioural characteristics, or between similar characteristics under different fire exposures valid for all products. Different classes address to a certain extent different exposures and different behavioural characteristics. Nevertheless, a higher classification should represent at least the same performance in each relevant characteristic, but should also represent a better performance, if all behavioural aspects relevant for the given class are considered.

A.2.5 The assumption is that products classified as A1 should 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 prEN 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 except floorings

a) Small fire attack on a limited area

Exposure: small flame without imposed radiation.

Geometry: — vertical specimen;
— surface and edge attack.

Fire situation: initial flame attack.

Performance aspects to be considered: — extent of burning and damage as a function of time;
— flaming droplets/particles.

b) Single burning item in a room

Exposure: single burning item.

Geometry: — corner;
— corner attack.

Fire situation: pre-flashover.

Performance aspects to be considered: — flame spread;
— heat and smoke release;
— flaming droplets / particles.

c) Fully developed fire in a room

Exposure: post-flashover fire.

Geometry: any.

Fire situation: any including post-flashover.

Performance aspects to be considered: — heat and smoke release;
— flame spread.

A.3.2 Reference fire situations for floorings

a) Small fire attack on a limited area

Exposure: small flame without imposed radiation.

Geometry: — vertical specimen;
— surface attack.

Fire situation: initial flame attack.

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

b) Fully developed fire in an adjacent room

Exposure: radiation on a limited area.

Geometry: horizontal specimen.

Fire situation: fully developed fire in an adjacent room.

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

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

c) Fully developed fire in a room

Exposure: post-flash-over fire.

Geometry: any.

Fire situation: any including post-flash-over.

Performance aspects to be considered: — heat and smoke release;
— fire spread.**A.4 Relationship between classes and reference fire situations****A.4.1 General**

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

A.4.2 For all construction products excluding floorings

- Class F: Products for which no reaction to fire performances are determined or which cannot be classified in one of the Classes A1, A2, B, C, D, E.
- Class E: Products capable of resisting, for a short period, a small flame attack without substantial flame spread.
- Class D: Products satisfying criteria for Class E 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: As Class D 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: As Class C but satisfying more stringent requirements.
- Class A2: Satisfying the same criteria as Class B 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: Class A1 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

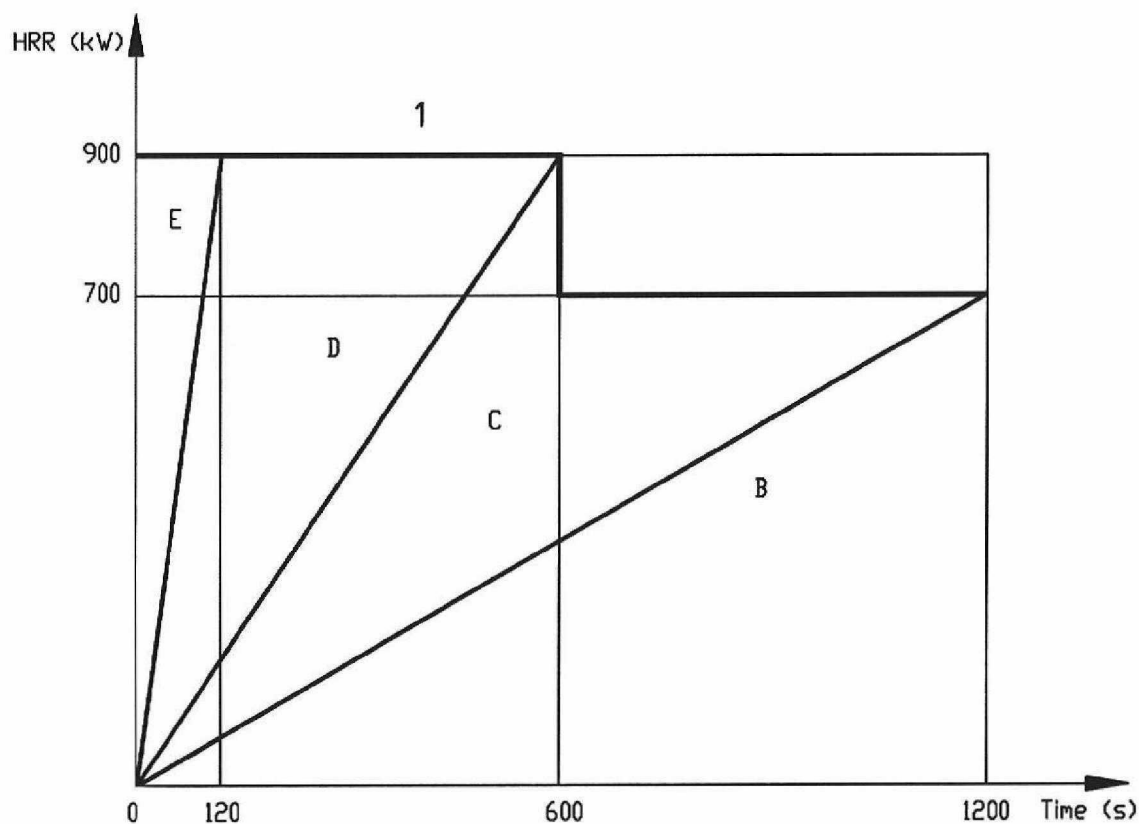
- d2 No limitation.
- d1 No flaming droplets/particles persisting longer than a given time occurred.
- d0 No flaming droplets/particles occurred.

A.4.3 For floorings

- Class F_{fl}: Products for which no reaction to fire performance is determined or which cannot be classified in one of the Classes A1_{fl}, A2_{fl}, B_{fl}, C_{fl}, D_{fl}, E_{fl}.
- Class E_{fl}: Products capable of resisting a small flame.
- Class D_{fl}: Products satisfying E_{fl} and in addition capable of resisting, for a certain period, a heat flux attack.
- Class C_{fl}: As Class D_{fl} but satisfying more stringent requirements.
- Class B_{fl}: As Class C_{fl} but satisfying more stringent requirements.
- Class A2_{fl}: Satisfying the same requirement as Class B_{fl} 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_{fl}: Class A1_{fl} 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

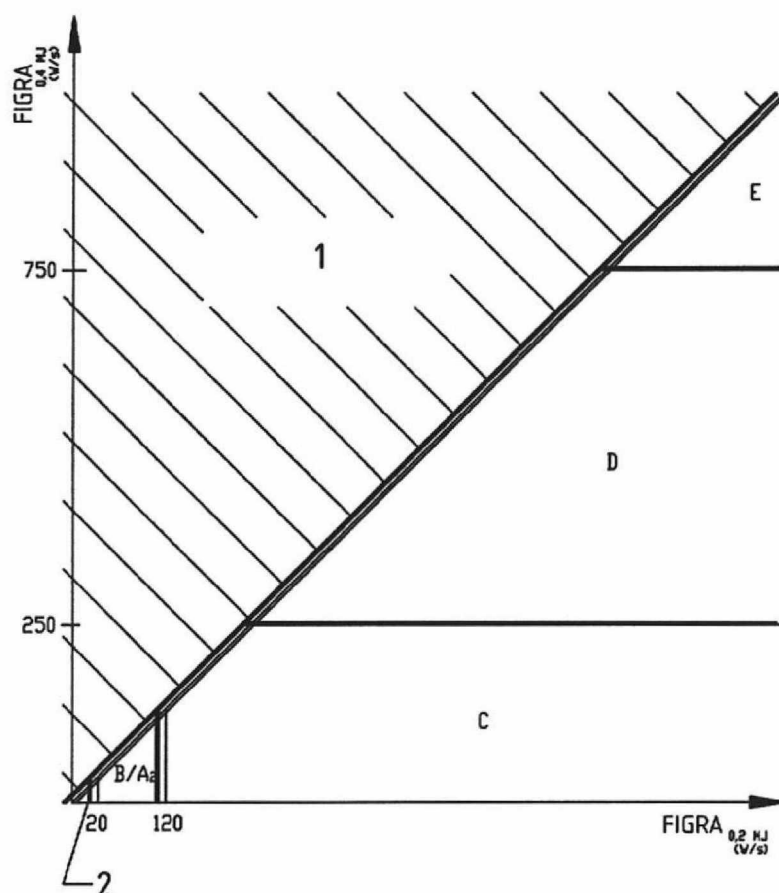
- s2 No limit.
- s1 The total smoke production is limited.

**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

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 $FIGRA_{0,2 MJ} \leq FIGRA_{0,4 MJ}$
- 2 Special procedure for Class A1

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

Annex B
(normative)
Reaction to fire classification report

B.1 General layout

LOGO/Letterhead of organization
undertaking classification
REACTION TO FIRE CLASSIFICATION REPORT OF PRODUCT XYZ
on behalf of
OWNER OF CLASSIFICATION REPORT
Address 1
Address 2
Address 3
Address 4

B.2 Introduction

This classification report defines the classification assigned to product xyz in accordance with the procedures given in EN 13501-1

B.3 Details of classified product

B.3.1 Nature and end use application

The product xyz is defined as a "type of classified product". Its classification is valid for the following end use application(s):

B.3.2 Description

Either

The product xyz is fully described in the test report(s) in support of the classification listed in **B.4.1**.

or

The product xyz comprises:

Description of the product including mounting and fixing elements.

The information shall be sufficiently detailed to identify the product.

(Optional)

According to the owner of this classification report, this product complies with the following European product specification(s).

B.4 Test reports and test results in support of this classification

B.4.1 Test reports

Name of laboratory	Name of sponsor	Test report ref. no.	Test method

B.4.2 Test results for construction products except floorings

Test method	Parameter	Number of tests	Results	
			Continuous parameter mean m	Compliance parameters
prEN ISO 11925-2 surface/edge flame attack* 15 s exposure 30 s exposure flaming droplets/particles	$F_s \leq 150 \text{ mm}$		—	Y or N
	$F_s \leq 150 \text{ mm}$		—	Y or N
	Ignition of the filter paper		—	Y or N
EN 13823	$FIGRA_{0,2\text{MJ}}$...	—
	$FIGRA_{0,4\text{MJ}}$		—	Y or N
	$LFS < \text{edge}$...	—
	$THR_{600\text{s}} \text{ (MJ)}$...	—
	$SMOGRA \text{ (m}^2/\text{s}^2\text{)}$...	—
	$TSP_{600\text{s}} \text{ (m}^2\text{)}$...	—
	Flaming droplets/particles		—	Y or N
prEN ISO 1182	$\Delta T \text{ (}^\circ\text{C)}^{(1)}$...	—
	$\Delta m \text{ (\%)}^{(1)}$...	—
	$t_f \text{ (s)}^{(1)}$...	—
prEN ISO 1716	$PCS \text{ (MJ/kg)}^{(1)+(2)+(4)}$			—
	$PCS \text{ (MJ/m}^2\text{)}^{(2)+(3)}$			—
	$PCI^{(5)}$			—
<p>* as required to the end use application of the product.</p> <p>— not applicable</p> <p>(1) for non-homogeneous products the parameters for each substantial component are given.</p> <p>(2) for non-homogeneous products the parameters for each external non-substantial component are given.</p> <p>(3) for non-homogeneous products the parameters for each internal non-substantial component are given.</p> <p>(4) the parameter for the product as a whole.</p> <p>(5) the corresponding PCI values where and if relevant for the classification (i.e. following a successful appeal).</p>				

B.4.3 Test results for floorings

Test method	Parameter	Number of tests	Results	
			Continuous parameter mean m	Compliance parameter
prEN ISO 11925-2: 15 s exposure	Flame spread ≤ 150 mm		—	Y or N
prEN ISO 9239-1	Critical flux (kW/m ²) Smoke (%.min)		— —
prEN ISO 1182	ΔT (°C) ⁽¹⁾ t_f (s) ⁽¹⁾ Δm (%) ⁽¹⁾		— — —
prEN ISO 1716	PCS (MJ/kg) ⁽¹⁾⁺⁽²⁾⁺⁽⁴⁾ PCS (MJ/m ²) ⁽²⁾⁺⁽³⁾ PCI ⁽⁵⁾			— —
— not applicable. (1) for non-homogeneous products the parameters for each substantial component are given. (2) for non-homogeneous products the parameters for each external non-substantial component are given. (3) for non-homogeneous products the parameters for each internal non-substantial component are given. (4) the parameter for the product as a whole. (5) the corresponding PCI values where and if relevant for the classification (i.e. following a successful appeal).				

B.5 Classification and direct field of application

B.5.1 Reference and direct field of application

This classification has been carried out in accordance with clause x.xx of EN 13501-1:2002.

B.5.2 Classification

The product xyz in relation to its reaction to fire behaviour is classified:

A1, A2, B, C, D, E

or

A1_f, A2_f, B_f, C_f, D_f, E_f

The additional classification in relation to smoke production is:

s1, s2, s3.

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

d0, d1, d2.

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

Fire behaviour		Smoke production			Flaming droplets	
B	—	S	3	,	d	2

i.e.: B – s3, d2

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

Fire behaviour		Smoke production	
A2 _{f1}	—	S	1

i.e.: A2_{f1} – s1

B.5.3 Field of application

This classification is valid for the following end use conditions:

- support/backing;
- with/without a void;
- type(s) of fixings;
- other aspects of end use conditions, e.g. type of joints.

This classification is also valid, for example, for the following product parameters:

- thickness;
- density.

B.6 Limitations

B.6.1 Restrictions

Statements concerning any restrictions on the duration of the validity of this classification report.

B.6.2 Warning

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

Report	Name	Signature*	Date
Prepared by			
Reviewed by			
*For and on behalf of "Name of the organization".			

Bibliography

ISO 9705:1993, *Fire tests — Full scale room tests for surface products.*

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