SLOVENSKI STANDARD
SIST EN 13501-1:2002

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Požarna klasifikacija gradbenih proizvodov in elementov stavb - 1. del: Klasifikacija po podatkih iz preskusov odziva na ogenj

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

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

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

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This European Standard was approved by CEN on 16 November 2001.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Contents

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of an identical text or by endorsement, at the latest by July 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.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 ≥ 1,0 kg/m^2 or a thickness ≥ 1,0 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 kg/m^2 and a thickness < 1,0 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 which 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, characterised 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 (C*HF*) or the radiant flux after a test period of 30 minutes (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* = $FIGRA_{0,2\ MJ}$

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

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]
FIGRA	fire growth rate index used for classification purposes
$FIGRA_{0,2MJ}$	fire growth rate index at *THR* threshold of 0,2 MJ
$FIGRA_{0,4MJ}$	fire growth rate index at *THR* threshold of 0,4 MJ
LFS	lateral flame spread [*m*]
PCS	gross calorific potential [MJ/kg or MJ/m^2]
PCI	net calorific potential [MJ/kg or MJ/m^2]

SMOGRA smoke growth rate

t_f duration of sustained flaming [s]

THR_{600s} total heat release within 600 s [MJ]

TSP_{600s} total smoke production within 600 s [m²]

' mean value of the set of results of a continuous parameter determined in accordance with the relevant test method using the minimum number of tests as specified in the test method

m mean value of the set of results of a continuous parameter determined in accordance with the procedure in 7.3 and used for classification

4 Classes of reaction to fire performance

The classes with their corresponding fire performance are given in:

- Table 1 for construction products excluding floorings;

- Table 2 for floorings.

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, $A1_{fl}$ and $A2_{fl}$.

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, $A1_{fl}$ and $A2_{fl}$.

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_{fl}, C_{fl}, D_{fl} and E_{fl}.