



SLOVENSKI STANDARD
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Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services

Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten - Teil 2: Klassifizierung mit den Ergebnissen aus den Feuerwiderstandsprüfungen, mit Ausnahme von Lüftungsanlagen

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Classement au feu des produits et éléments de construction - Partie 2: Classement à partir des données d'essais de résistance au feu des produits utilisés dans les systèmes de ventilation

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English Version

Fire classification of construction products and building elements
- Part 2: Classification using data from fire resistance tests,
excluding ventilation services

Classement au feu des produits et éléments de
construction - Partie 2: Classement à partir des données
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systèmes de ventilation

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Brandverhalten - Teil 2: Klassifizierung mit den
Ergebnissen aus den Feuerwiderstandsprüfungen, mit
Ausnahme von Lüftungsanlagen

This European Standard was approved by CEN on 30 November 2006.

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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 CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 13501-2:2007) has been prepared by Technical Committee CEN/TC 127 "Fire safety in buildings", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2008, and conflicting national standards shall be withdrawn at the latest by April 2008.

This document supersedes EN 13501-2:2003.

The first edition of this European Standard was prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, supporting essential requirements of the Construction Products Directive.

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

Changes have been made in this revision to bring it in line with the relevant current EC Decisions on fire resistance classification, and experience in use in the first edition.

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 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, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

The aim of this European Standard is to define a harmonised procedure for the classification for resistance to fire of construction products and building elements. This classification is based on the test procedures listed in Clauses 2 and 7.

This European Standard is prepared in support of the second essential requirement in the EC Construction Products Directive (89/106/EEC) which is detailed in the Interpretative Document number 2 (ID2): Safety in case of fire (OJ C62 Vol 37). It reflects the Commission Decision of 3 May 2000 on the implementation of the Council Directive 89/106/EEC as regards the classification of the resistance to fire performance of construction products, construction works and parts thereof.

The Interpretative Document and the Commission Decision of 2 May 2000 specify performance and classes regarding fire resistance. These classes are identified by designation letters, each of which refers to an important characteristic of fire resistance behaviour.

This European Standard provides for a common understanding for these requirements. It interprets the functional requirements for the different groups of building elements and explains the method for deriving their classification on the basis of test results for individual elements.

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1 Scope

This European Standard specifies the procedure for classification of construction products and building elements using data from fire resistance and smoke leakage tests which are within the direct field of application of the relevant test method. Classification on the basis of extended application is outside the scope of this European Standard. For extended application, however, the same classes are used as specified in this European Standard.

This European Standard deals with:

a) loadbearing elements without a fire separating function:

walls;
floors;
roofs;
beams;
columns;
balconies;
walkways;
stairs.

b) loadbearing elements with a fire separating function, with or without glazing, services and fixtures:

walls;
floors;
roofs;
raised floors.

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c) products and systems for protecting elements or parts of the works

ceilings with no independent fire resistance;
fire protective coatings, claddings and screens;

d) non-loadbearing elements or parts of works, with or without glazing, services and fixtures:

partitions;
facades (curtain walls) and external walls;
ceilings with independent fire resistance;
fire doors and shutters and their closing devices;
smoke control doors;
conveyor systems and their closures;
penetration seals;
linear joint seals;
service ducts and shafts;
chimneys.

e) wall and ceiling coverings with fire protection ability.

f) lift landing doors which are tested according to EN 81-58 are excluded from this European Standard. Lift landing doors which are tested according to EN 1634-1 are classified in accordance with 7.5.5.

Relevant test methods which have been prepared for these elements are listed in Clauses 2 and 7.

2 Normative references

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

EN 1363-2, *Fire resistance tests — Part 2: Alternative and additional procedures*

EN 1364-1, *Fire resistance tests for non-loadbearing elements — Part 1: Walls*

EN 1364-2, *Fire resistance tests for non-loadbearing elements — Part 2: Ceilings*

EN 1364-3, *Fire resistance tests for non-loadbearing elements — Part 3: Curtain walling - Full configuration (complete assembly)*

EN 1364-4, *Fire resistance tests for non-loadbearing elements — Part 4: Curtain walling — Part configuration*

EN 1365-1, *Fire resistance tests for loadbearing elements — Part 1: Walls*

EN 1365-2, *Fire resistance tests for loadbearing elements — Part 2: Floors and roofs*

EN 1365-3, *Fire resistance tests for loadbearing elements — Part 3: Beams*

EN 1365-4, *Fire resistance tests for loadbearing elements — Part 4: Columns*

EN 1365-5, *Fire resistance tests for loadbearing elements — Part 5: Balconies and walkways*

EN 1365-6, *Fire resistance tests for loadbearing elements — Part 6: Stairs*

EN 1366-3, *Fire resistance tests for service installations — Part 3: Penetration seals*

EN 1366-4, *Fire resistance tests for service installations — Part 4: Linear joint seals*

EN 1366-5, *Fire resistance tests for service installations — Part 5: Service ducts and shafts*

EN 1366-6, *Fire resistance tests for service installations — Part 6: Raised access and hollow core floors*

EN 1366-7, *Fire resistance tests for service installations — Part 7: Conveyor systems and their closures*

EN 1634-1, *Fire resistance tests for door and shutter assemblies — Part 1: Fire doors and shutters*

EN 1634-3, *Fire resistance tests for door and shutter assemblies — Part 3: Smoke control doors and shutters*

EN 13216-1, *Chimneys — Test methods for system chimneys — Part 1: General test methods*

CEN/TS 13381-1, *Test methods for determining the contribution to the fire resistance of structural members — Part 1: Horizontal protective membranes*

ENV 13381-2, *Test methods for determining the contribution to the fire resistance of structural members — Part 2: Vertical protective membranes*

ENV 13381-3, *Test methods for determining the contribution to the fire resistance of structural members — Part 3: Applied protection to concrete members*

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ENV 13381-4, *Test methods for determining the contribution to the fire resistance of structural members — Part 4: Applied protection to steel members*

ENV 13381-5, *Test methods for determining the contribution to the fire resistance of structural members — Part 5: Applied protection to concrete/profiled sheet steel composite members*

ENV 13381-6, *Test methods for determining the contribution to the fire resistance of structural members — Part 6: Applied protection to concrete filled hollow steel columns*

ENV 13381-7, *Test methods for determining the contribution to the fire resistance of structural members — Part 7: Applied protection to timber members*

EN 14135, *Coverings — Determination of fire protection ability*

EN 14600, *Doorsets and openable windows with fire resisting and/or smoke control characteristics — Requirements and classification*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 13943:2000 and the following apply.

3.1

element of building construction

defined part of a construction component, e.g. wall, partition, floor, roof, beam or column (EN 1363-1:1999). An element, for the purpose of this European Standard, covers both individual products and elements made up of one or more products

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3.2

ceiling

non-loadbearing element of a building construction designed to provide horizontal fire separation

(EN 1364-2:1999)

3.3

self-supporting ceiling

ceiling with a span from wall to wall, without any additional suspension devices

(EN 1364-2:1999)

3.4

door or shutter assembly (doorset)

complete assembly, including any frame or guide, door leaf or leaves, rolling or folding curtain etc., which is provided for closing of permanent openings in separating elements. This includes all side-panels, vision panels or transom panels, together with the door hardware and any seals (whether provided for the purpose of fire or smoke control or for other purposes such as draught control or acoustics) which are used in the assembly

(EN 1634-1:2000)

3.5

floor

horizontal element of building construction which is loadbearing

(EN 1365-2:1999)

3.6**roof**

horizontal or sloped element of building construction which is loadbearing

(EN 1365-2:1999)

3.7**suspended ceiling**

ceiling which is suspended from a supporting construction

(EN 1364-2:1999)

3.8**loadbearing wall**

wall designed to support an applied load

(EN 1365-1:1999)

3.9**non-loadbearing wall**

wall designed not to be subjected to any load other than its self weight

(EN 1364-1:1999)

3.10**internal wall**

wall which provides fire separation. It can be exposed separately to a fire from either side

(EN 1364-1:1999 and EN 1365-1:1999)

3.11**external wall**

wall forming the external envelope of a building which may be exposed separately to an internal or an external fire

(EN 1364-1:1999 and EN 1365-1:1999)

3.12**insulated wall**

wall, with or without glazing, which satisfies both the integrity and insulation criteria for the achieved fire resistance period

(EN 1364-1:1999 and EN 1365-1:1999)

3.13**un-insulated wall**

wall, with or without glazing, which satisfies the integrity and, where required, the radiation criteria for the achieved fire resistance period but which is not intended to provide insulation. Such a wall can consist entirely of un-insulated fire resistant glazing

(EN 1364-1:1999 and EN 1365-1:1999)

3.14**separating wall**

wall with or without glazing provided within a building or between adjoining buildings to prevent the transfer of fire from one side to the other

(EN 1364-1:1999 and EN 1365-1:1999)

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3.15

curtain wall

external non-loadbearing wall which is independent of the structural frame and supported in place in front of loadbearing structures. A curtain wall typically includes panels, glazing, seals, fixings, transoms and mullions

(EN 1364-3:2006)

3.16

fire resistant glazing

glazing system consisting of one or more transparent or translucent panes with a suitable method of mounting, with e.g. frames, seals and fixing materials, capable of satisfying the appropriate fire resistance criteria

(EN 1364-1:1999)

3.17

insulated glazing

fire resistant glazing which satisfies both the integrity and insulation criteria for the achieved fire resistance period

(EN 1364-1:1999)

3.18

un-insulated glazing

fire resistance glazing which satisfies the integrity and, where required, the radiation criteria for the achieved fire resistance period but which is not intended to provide insulation

(EN 1364-1:1999)

3.19

glazed element

building element with one or more (light transmissive) panes, fire resistant or not, that are built in a frame with fixings and seals

(EN 1364-1:1999)

3.20

test specimen

element (or part) of building construction provided for the purpose of determining either its fire resistance or its contribution to the fire resistance of another building element

(EN 1363-1:1999)

3.21

loadbearing element

element that is intended for use in supporting an external load in a building and maintaining this support in the event of a fire

(EN 1363-1:1999)

3.22

separating element

element that is intended for use in maintaining separation between two adjacent areas of a building in the event of a fire

(EN 1363-1:1999)

3.23**smoke leakage**

ability of an element of construction to reduce the passage of hot and/or cold gases or smoke from one side of the element to the other to below specified levels

(EN 1363-1:1999)

3.24**sustained flaming**

continuous flaming for a period of time greater than 10 s

(EN 1363-1:1999)

3.25**load level**

magnitude of the test load (mechanical actions) in relation to the loadbearing capacity of the member at normal temperature

NOTE The loadbearing capacity of the member at normal temperature is determined by testing or calculation, taking into account the actual mechanical properties of the loadbearing element tested.

3.26**covering**

product intended to protect underlying products against damage during a specified fire exposure

3.27**direct field of application**

includes the variations in the construction and the limits of use for the element which, without further analysis, are covered by the single test result, with respect to defined performance characteristics that have been achieved from a fire resistance test according to the appropriate test standard

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3.28**extended field of application**

includes variations in the construction and limits of use for an element that has been subject to one or more fire tests according to the appropriate standard. Extended application is done following procedures laid down in extended application standards

3.29**closure and conveyor system assembly**

complete assembly of the closure for the conveyor system and, where relevant, its frame or guide, which is provided for closing off a permanent opening in a separating element. This includes the anchoring parts for the connection with the separating element, a length of any penetrating component on either side of the construction and the penetration seal, any sealing system between the closure for a conveyor system, the conveyor system and any closing and/or separating device

(EN 1366-7:2004)

4 Fire scenarios**4.1 General**

The second essential requirement of the Construction Products Directive addresses spread of fire and smoke and the loadbearing capacity of the construction. These requirements are considered to be satisfied by proving fire resistance of loadbearing and/or separating elements.

Fire resistance of loadbearing and/or separating elements shall be assessed using one or more of the levels of thermal attack given in 4.2 to 4.6. Further clauses of this European Standard identify which attack(s) shall be used for which elements.

NOTE 1 The various levels of thermal action given in 4.2 to 4.6 reflect different fire scenarios and the standards which prescribe their translation into practical tests give tolerances for their application.

NOTE 2 Other heating curves exist, for example the hydrocarbon curve. Also, for extreme fire scenarios (e.g. traffic tunnels, nuclear plants), more severe conventional curves can be specified. These are not, however, used for the classification of elements according to this European Standard.

4.2 The standard temperature/time curve (post flash-over fire)

When applied as a basis for testing, the standard temperature/time relationship shall be applied for the full duration of the test. The relationship, which is a model of a fully developed fire in a compartment, is given by the following relationship:

$$T = 345 \log_{10} (8t + 1) + 20$$

where

t is the time from the start of the test in minutes (min);

T is the mean furnace temperature in degrees Celsius (°C).

NOTE Further details relating to the practical application of this curve and other test parameters, e.g. tolerances, are given in EN 1363-1.

4.3 The slow heating curve (smouldering fire)

The smouldering fire test shall only be used if it is expected that the fire resistance performance of the element may be reduced by exposure to temperatures associated with the growth stage of a fire. It is, therefore, particularly relevant to elements whose performance may be dependent upon high heating rates below approximately 500 °C (as provided during the standard temperature/time curve) for achievement of their classifications (i.e. mainly reactive or intumescent products).

The slow heating curve is given by the following relationship:

for $0 < t \leq 21$

$$T = 154t^{0.25} + 20$$

for $t > 21$

$$T = 345 \log_{10} (8(t-20) + 1) + 20$$

where

t is the time from start of test in minutes (min);

T is the mean furnace temperature in degrees Celsius (°C).

NOTE Further details relating to the practical application of this curve, and other test parameters e.g. tolerances, are given in EN 1363-2.

4.4 The 'semi-natural' fire

During the 'semi-natural' fire test the temperature of the fire gases adjacent to the soffit of the ceiling shall reach 1 000 °C within 10 min to 20 min of the start of the test.

Because of the difficulties in achieving the necessary thermal attack in a conventional furnace, the attack shall be provided by fire from wooden cribs made from softwood.

NOTE 1 The 'semi-natural' fire is a fire which produces direct flame impingement with a high convective heat transfer content which is not realised in furnace tests using the standard temperature/time curve. The term 'semi-natural' fire corresponds to the single burning item exposure required for ceilings in 4.3.1.3.4 (a) of the Interpretative Document 2 (not to be confused with the "single burning item" test for reaction to fire). It is relevant only for lightweight suspended horizontal protective membranes having a low thermal inertia.

NOTE 2 Further details relating to the practical application of this thermal attack, and other test parameters, are given in CEN/TS 13381-1.

4.5 The external fire exposure curve

This is a temperature/time relationship which represents the exposure of the external face of a wall to fire which may emerge from a window of a building, or from a free-burning external fire.

The curve is defined by the relationship:

$$T = 660 (1 - 0,687 e^{-0,32t} - 0,313 e^{-3,8t}) + 20$$

where

t is the time from start of test in minutes (min);

T is the mean furnace temperature in degrees Celsius (°C).

NOTE Further details relating to the practical application of this curve, and other test parameters e.g. tolerances, are given in EN 1363-2.

4.6 Constant temperature attack

In addition to the heating regimes given above, the evaluation of some elements shall be made using a notional constant value of temperature. The specified temperature depends upon the type of element. The rate at which this temperature is achieved is specified in each relevant test standard.

The following temperatures shall be used for the elements indicated:

20 °C for evaluating the leakage rate of smoke control doors at ambient temperature;

200 °C for evaluating the leakage rate of medium temperature smoke control doors;

500 °C for evaluating the fire performance of raised floors;

1 000 °C for evaluating soot fire resistance of chimneys and chimney related products.

5 Resistance to fire performance characteristics

5.1 General

ID2 requires the assessment of the characteristic loadbearing capacity and/or integrity and/or insulation. Further optional characteristics are also specified by ID2, namely radiation, mechanical