
**Požarna klasifikacija gradbenih proizvodov in elementov stavb – 4. del:
Klasifikacija na podlagi podatkov iz preskusov požarne odpornosti na sestavnih
delih sistemov za nadzor dima**

Fire classification of construction products and building elements - Part 4: Classification using data from fire resistance tests on components of smoke control systems

Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten - Teil 4: Klassifizierung mit den Ergebnissen aus den Feuerwiderstandsprüfungen von Anlagen zur Rauchfreihaltung

Classification de la résistance au feu de produits et éléments de construction - Partie 4: Classification des résultats des tests de la résistance au feu des composants de dispositifs de contrôle de fumée

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ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
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English Version

Fire classification of construction products and building elements
- Part 4: Classification using data from fire resistance tests on
components of smoke control systems

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éléments de construction - Partie 4: Classification des
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Brandverhalten - Teil 4: Klassifizierung mit den
Ergebnissen aus den Feuerwiderstandsprüfungen von
Anlagen zur Rauchfreihaltung

This European Standard was approved by CEN on 16 December 2006.

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

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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

Contents

Page

Foreword	4
Introduction	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions.....	7
4 Fire scenarios.....	8
4.1 General.....	8
4.2 The standard temperature/time curve (post flash-over fire)	8
4.3 The slow heating curve (smouldering fire).....	9
4.4 Constant temperature attack	9
4.5 Specific thermal actions.....	9
4.5.1 Smoke control ducts.....	9
4.5.2 Smoke control dampers	9
4.5.3 Smoke barriers	9
4.5.4 Powered smoke and heat exhaust ventilators	10
4.5.5 Natural smoke and heat exhaust ventilators	10
5 Resistance to fire performance characteristics.....	10
5.1 General.....	10
5.2 Performance characteristics.....	10
5.2.1 E – Integrity.....	10
5.2.2 I – Insulation	11
5.2.3 S – Smoke leakage	11
5.2.4 D – Stability duration under constant temperature	12
5.2.5 DH – Stability duration under the standard time-temperature curve	12
5.2.6 F – Functionality of powered smoke and heat ventilators.....	12
5.2.7 B – Functionality of natural smoke and heat ventilators	12
6 Declaration of performance	12
6.1 Classification periods.....	12
6.2 Designatory letters.....	12
6.3 Declaration of performance	13
6.4 Declaration of classes in product standards	13
6.5 Number of tests required for classification.....	13
7 Classification procedure for fire resistance.....	13
7.1 General.....	13
7.1.1 Procedure	13
7.1.2 General rules for deducing the number of fire resistance tests	14
7.2 Classification of smoke control ducts	14
7.2.1 General.....	14
7.2.2 Test methods.....	15
7.2.3 Tests to be carried out.....	15
7.2.4 Performance criteria	16
7.2.5 Classes.....	16
7.3 Classification of smoke control dampers.....	17
7.3.1 General.....	17
7.3.2 Test method.....	17
7.3.3 Tests to be carried out.....	17
7.3.4 Performance criteria	18
7.3.5 Classes.....	20

7.4	Classification of smoke barriers	21
7.4.1	General	21
7.4.2	Test method	21
7.4.3	Tests to be carried out.....	21
7.4.4	Performance criteria	21
7.4.5	Classes.....	22
7.5	Classification of powered smoke and heat exhaust ventilators	22
7.5.1	Test method.....	22
7.5.2	Tests to be carried out.....	22
7.5.3	Performance criteria	22
7.5.4	Classes.....	22
7.6	Classification of natural smoke and heat exhaust ventilators	23
7.6.1	Test method.....	23
7.6.2	Tests to be carried out.....	23
7.6.3	Performance criteria	23
7.6.4	Classes.....	23
Annex A	(normative) Classification report	24
A.1	General	24
A.2	Content and format.....	24

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Foreword

This document (EN 13501-4:2007) 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 July 2007, and conflicting national standards shall be withdrawn at the latest by July 2007.

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

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

EN 13501 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

This European Standard defines a harmonised procedure for the classification for resistance to fire of construction products. This classification is based on the test procedures sited in the relevant documents listed in Clause 2.

This European Standard is prepared in support of the second essential requirement, in the EC Construction Products Directive (89/106/CEC) and is detailed in the Interpretative Document number 2 (ID2): Safety in case of fire (OJC62 Vol 37).

The Interpretative Document and the Commission Decision of 3 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 products/elements and explains the method for deriving their classification on the basis of test results for individual products/elements.

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1 Scope

This European Standard specifies the procedure for classification of components of smoke control systems, using data from fire resistance tests which are within the field of application of the relevant test methods. Classification on the basis of extended application is not within the scope of this European Standard, however for extended application the same classes are used as specified in this European Standard.

Products covered by this European Standard are:

- smoke control ducts;
- smoke control dampers;
- smoke barriers;
- powered smoke and heat exhaust ventilators (fans), including connectors;
- natural smoke and heat exhaust ventilators.

Relevant documents which include the relevant test methods which have been prepared for these products are listed in Clause 2.

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.

- <https://standards.iteh.ai/catalog/standards/sist/4147ad2d-33d9-4a73-9137-7387b4287e9/sist-en-13501-4-2007>
- EN 1363-1, *Fire resistance tests — Part 1: General requirements*
- EN 1363-2, *Fire resistance tests — Part 2: Alternative and additional procedures*
- EN 1366-1, *Fire resistance tests for service installations — Part 1: Ducts*
- EN 1366-2, *Fire resistance tests for service installations — Part 2: Fire dampers*
- EN 1366-8, *Fire resistance tests for service installations — Part 8: Smoke extraction ducts*
- prEN 1366-9, *Fire resistance tests for service installations — Part 9: Single compartment smoke extraction ducts*
- prEN 1366-10, *Fire resistance tests for service installations — Part 10: Smoke control dampers*
- EN 12101-1:2005, *Smoke and heat control systems — Part 1: Specification for smoke barriers*
- EN 12101-2, *Smoke and heat control systems — Part 2: Specification for natural smoke and heat exhaust ventilators*
- EN 12101-3, *Smoke and heat control systems — Part 3: Specification for powered smoke and heat exhaust ventilators*
- 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

direct field of application

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

3.2

extended field of application

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

3.3

test specimen

product provided for test purposes

3.4

smoke control duct

duct used in a system to control the movement and/or containment of smoke and heat

3.5

multi compartment smoke control duct

smoke control duct designed to provide a degree of fire resistance for use in multi compartment applications

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3.6

smoke control damper

device, open or closed in its operational position to control the flow of smoke and hot gasses, which is automatically or manually activated

3.6.1

single-compartment smoke control damper

smoke control damper for use within a single compartment, associated with a single compartment smoke extraction duct tested to prEN 1366-9

3.6.2

multi-compartment fire resisting smoke control damper

smoke control damper for use in multi-compartment applications, associated with a smoke extraction duct tested to EN 1366-8

3.7

smoke barrier

device to channel, contain and/or prevent the migration of smoke (fire effluent)

NOTE Smoke barriers may also be referred to as smoke curtains, smoke blinds or smoke screens.

3.8

smoke and heat exhaust ventilator

device specially designed to move smoke and hot gasses out of a construction works under conditions of fire

3.9

powered smoke and heat exhaust ventilator

powered device (usually a fan) that is suitable for exhausting hot gasses from a building under fire conditions

NOTE Such devices are often able to function under fire conditions for a limited period only.

3.10

natural smoke and heat exhaust ventilator

device specifically designed to move smoke and hot gasses out of the construction works by buoyancy forces

4 Fire scenarios

4.1 General

The essential requirement 'safety in case of fire' of the Construction Products Directive addresses the spread of fire and smoke in a building. To demonstrate satisfaction of this requirement, the fire resistance performance of these components is addressed in this European Standard.

Fire resistance can be assessed using one or more of the levels of thermal attack given in 4.2 to 4.5.

Later clauses of this European Standard identify which attack(s) shall be used for which products.

The various levels of thermal action given in 4.2 to 4.5 reflect different fire scenarios and the standards which prescribe their translation into practical tests give tolerances for their application.

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

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

The 'post flash-over' fire test utilises the 'standard temperature/time relationship' which is a model of a fully developed fire in a compartment. It 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).

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

When applied as a basis for testing the relationship shall be applied for the full duration of the test.

4.3 The slow heating curve (smouldering fire)

The 'smouldering' fire test is only used if the fire resistance performance of the product is expected to be reduced by exposure to temperatures associated with the growth stage of a fire. It is, therefore, particularly relevant to products whose performance may be dependent upon high heating rates below approximately 500 °C (defined in 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).

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

4.4 Constant temperature attack

In addition to the heating regimes given above, the evaluation of smoke barriers and smoke and heat exhaust ventilators is made using a notional constant temperature attack. The specified temperature and the rate at which the temperature is reached, is specified in the relevant test method.

4.5 Specific thermal actions

4.5.1 Smoke control ducts

Multi-compartment ducts – standard temperature/time curve.

Single compartment ducts – a constant temperature of either 300 °C or 600 °C, following the standard temperature/time curve up to the specified constant temperature.

NOTE prEN 1366-9 does not include a test for assessing integrity at 300 °C.

4.5.2 Smoke control dampers

Multi-compartment dampers – standard temperature/time curve.

Single compartment dampers – a constant temperature of either 300 °C or 600 °C, following the standard temperature/time curve up to the specified constant temperature.

NOTE prEN 1366-10 does not include a test for assessing integrity at 300 °C.

4.5.3 Smoke barriers

A constant temperature of 600 °C, following the standard temperature/time curve up to the specified constant temperature.

4.5.4 Powered smoke and heat exhaust ventilators

A constant temperature of:

200 °C, reached within 5 min to 10 min, or

300 °C, reached within 5 min to 10 min, or

400 °C, reached within 5 min to 10 min, or

600 °C, reached within 5 min to 10 min, or

842 °C following the standard temperature/time curve up to the specified constant temperature.

4.5.5 Natural smoke and heat exhaust ventilators

A constant temperature of 300 °C, increasing the furnace temperature following a gradient as specified in EN 12101-2.

A constant temperature of 600 °C, increasing the furnace temperature following a gradient as specified in EN 12101-2.

A constant temperature of θ °C, increasing the furnace temperature following a gradient as specified in EN 12101-2.

NOTE θ °C is an open class for special applications.

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5 Resistance to fire performance characteristics

[SIST EN 13501-4:2007](https://standards.iteh.ai/catalog/standards/sist/en-13501-4-2007)

5.1 General

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The essential requirement 'safety in case of fire' of the Construction Products Directive requires the products covered in this standard to be assessed against specified characteristics. These include integrity, insulation, stability, smoke leakage and reliability. This clause provides the necessary details of each of the above characteristics.

Where a characteristic may have more than one different definition or type of performance, later clauses identify which specific definition applies to which products.

5.2 Performance characteristics

5.2.1 E – Integrity

Integrity E is the ability of a component of a smoke control system to prevent the transmission of fire as a result of the passage of significant quantities of flames or hot gases from the fire to the unexposed side, thereby causing ignition either of the non-fire exposed surface or of any material adjacent to that surface.

The assessment of integrity is made on the basis of one or more of the following aspects simultaneously:

- cracks or openings in excess of given dimensions;
- ignition of a cotton pad;
- sustained flaming on the non-exposed side;