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Guidance on direct and extended application

Leitfaden zum direkten und erweiterten Anwendungsbereich zum Brandverhalten von Bauprodukten

Guide des applications directes et étendues

Ta slovenski standard je istoveten z: **CEN/TS 15117:2005**

ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
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Guidance on direct and extended application

Guide pour l'établissement des applications directes et des applications étendues

Leitfaden zum direkten und erweiterten Anwendungsbereich zum Brandverhalten von Bauprodukten

This Technical Specification (CEN/TS) was approved by CEN on 3 April 2005 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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Foreword

This Technical Specification (CEN/TS 15117:2005) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, the secretariat of which is held by BSI.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this CEN Technical Specification: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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CEN/TS 15117:2005 (E)**1 Scope**

This Technical Specification gives guidance for the direct and extended application instructions, in order to fulfil the instructions from the EU Commission to evaluate the reaction to fire performance of products as placed on the market and of its end-use application(s), where relevant.

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

EN 13501(all parts), *Fire classification of construction products and building elements.*

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 1182, *Reaction to fire tests for building products – Non-combustibility test (ISO 1182:2002).*

EN ISO 1716, *Reaction to fire tests for building products – Determination of the heat of combustion (ISO 1716:2002).*

EN ISO 9239-1, *Reaction to fire tests for floorings – Part 1: Determination of the burning behaviour using a radiant heat source (ISO 9239-1:2002).*

EN ISO 11925-2, *Reaction to fire tests - Ignitability of building products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2002).*

3 Terms and definitions

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

3.1**test result**

outcome of a testing process and its associated procedures detailed within a specific test standard (which may include some processing of the results from the testing of a number of specimens). A test result is expressed in terms of one or more fire performance parameter(s)

3.2**direct field of application of test results**

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

3.3**extended field of application of test results**

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

3.4**classification**

process defined in the Parts of EN 13501, whereby the fire performance parameters obtained from the results of one test, or a set of tests, or from a process of extended application, are compared with limiting values for those parameters that are set as criteria for achieving a certain classification. The relevant classes and related criteria for fire resistance, for reaction to fire and for external fire exposure to roofs, are specified in Commission Decisions (2000/367/EC, 2000/147/EC and 2001/671/EC respectively)

3.5**product**

material, element or component, about which information is required (EN 13501-1). Refers to a construction product, as defined by the Construction Products Directive (CPD), from an individual producer (i.e. the item to which the CE marking applies) (EC Guidance Paper G)

3.6**product group**

range of products within defined limits of variability (defined by the manufacturer or a technical specification) of the product parameters and, if relevant, end-use parameters, for which the reaction to fire performance remains unchanged (does not get worse)

3.7**product parameter**

aspect of a product (for example thickness, composition, density) which may vary and which may or may not have an influence on the product's fire performance

3.8**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, its orientation, its position in relation to other adjacent products and its method of fixing (EN 13501-1)

3.9**end-use application parameter**

aspect of the mounting and fixing arrangement of a product reflecting/simulating its end use application (for example type of substrate, fixing method, position and type of joints) which may or may not affect the fire performance

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Table 1 gives examples of product parameters and end-use application parameters which may have to be taken into account in developing direct and extended application rules. If other parameters are found to be relevant for a given product, then these too should be considered.

The technical specification of the manufacturers has to define the end-use application parameters for the particular product (group) which could influence the results of the reaction to fire tests in the fire tests.

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Table 1 – Examples for product and end-use application parameters (non-exhaustive list)

Product parameters	End-use application parameters
Thickness	Substrate or underlying construction
Density (or related parameter, e.g. mass/square metre)	Mounting method (e.g. directly onto substrate, onto wooden framework)
Colour	Fixing method (e.g. adhesive, spacing and type of fixings (screws, nails, etc.))
Surface coating/facing	Type and position of joints
Composition of the product	Presence of air gaps
Geometry and structure, product shape, number and composition of layers, ...	Product orientation and geometry
	Exposure to thermal attack

5 Direct application

5.1 General principles for direct application

This clause gives the principles of, and rules for, the development of direct application of tests results leading to fire classification. It also lists the product parameters and end-use application parameters which need to be taken into account. Parameters will need to be examined one by one depending on the product, and the limits chosen to ensure that the basic principle, that the reaction to fire performance remains unchanged, holds.

Two possibilities exist for the development and implementation of direct application rules. The first is where the rules are developed by, for example, a CEN product TC (or EOTA WG) in collaboration with CEN TC127 and then these rules are written into a harmonised technical specification. These rules/limits are then applicable to all users of the technical specification. The second is where an individual manufacturer, in the absence of written rules/limits in the technical specification, develops his own rules/limits for his particular product or product group. These rules/limits then apply only to that manufacturer. In this case, however, the manufacturer shall follow the guidelines given in this document.

In developing direct application rules, the concept of 'lowest' performance is important. This means that any change to the product or end use application parameters which goes in the direction of improving the fire performance can be relatively easily applied. Changes which go in the direction of lowering the fire performance have to be treated with care, so as to ensure that there is no lowering of the product's fire performance sufficient to lead to a lowering of (additional) class or classification. Each fire performance parameter shall be considered independently.

Direct application rules may apply to an individual product, or a product group, each in their end use application(s).

While there are commercial and technical advantages in trying to develop direct application limits for all products covered by a given harmonised technical specification, there is no specific requirement to do so. Nor is there any specific requirement to define limits for all parameters of the product and its end use applications parameters which have an effect on fire performance. Where parameters are not given in a harmonised product specification, then manufacturers have to develop their own specific rules/ limits.

Annex A gives a more detailed presentation of possible effect of changes in product parameters on classification, and B.1 gives examples of some direct application rules.

6 Extended application

6.1 General principles for extended application

Two options to establish rules for extended application are possible:

- by use of additional tests results which, together with the initial test result, enables consideration of a larger range of one or several product and end-use application parameters,
- by use of tests results and additional calculations relating the product and end-use application parameters to the fire performance.

6.2 Extended application by additional tests

6.2.1 Additional tests on one product/end-use application parameter

It is assumed that only one product/end-use application parameter changes and the other parameters remain constant and that there is an initial test result on one value of the product/end-use application parameter.

If the relationship between the fire performance and the product/end-use application parameter is unknown, the tests will be carried out on several variants of the parameter to assess the complete range of the product/end-use application parameter on which the extended application is required and to know this relationship. From this relationship it will be possible to predict the different levels of fire performance as a function of the levels of the product/end-use application parameter and therefore the level of classification.

If for a product or a product group there is an established rule about the relationship between the product/end-use parameter and the fire performance (direct application), it will be possible to optimise the additional tests, as a function of the classification result which is expected, as follows:

- If a fire performance parameter is known to change with the change of a product/end-use application parameter(s) in a known direction, the test can be carried out on the parameter, the variation of which is known to give the lowest (worst) classification for this product and/or its end use-application.
- If it is known that the fire performance changes with a change of the product/end-use application parameter but the relationship is not known, the number of additional tests shall be sufficient to define the relationship (sufficient means that the relationship is fully defined over the intended range of parameter variation). For most relationships this will require at least two additional test results.

When a relationship has been established, it may be used to establish the value of the fire performance parameters used to determine the classification of any product or product group covered by this relationship.

B.2 gives examples of this procedure.

6.2.2 Additional tests on several product/end-use application parameters

When more than one product or end-use application parameter is to change, and if the types of relationship are not known, it will be necessary to assess the tests needed according to an experimental plan or an empirical approach, examples of which are given in C.1 and C.2.

Then a more detailed series of tests should be performed to determine the relationship between these parameters and the fire performance.

The study of this relationship shall be carried out from direct tests according to the harmonized European test methods such as EN ISO 1716, EN ISO 1182, EN 13823, EN ISO 11925-2 and EN ISO 9239-1.

If the types of relationship between the fire performance and the product/end use application parameter are not known a series of tests will be necessary. The test series can be split into parts to get firstly a result on the type of the relationship (qualitative result) and secondly full information on the relationship (mathematical formula), if required.

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When a simple approach is used, it has to be kept in mind that the resulting relationships are only valid for the particular level of the other parameters which were kept constant in the test. A fuller picture with less tests necessary can be achieved when statistical test planning methods are used.

NOTE Results from other test methods may be used to determine which product parameter need to be tested in European standard methods.

6.3 Extended application by calculation

For extended application by calculation, it is necessary to have (an) established calculation method(s) shown to be valid for the intended range of parameter(s). This normally requires the calculation method to be validated in accordance with 6.2.1 or 6.2.2.

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Annex A (normative)

Influence of product and end-use parameters on reaction to fire test performance

A.1 Introduction

In the main body of this document, Table 1 shows a non-exhaustive list of product and end-use application parameters which may or may not influence the reaction to fire test performance of a product. The following is an analysis of how each of these parameters might influence the test result for each of the five reaction to fire test methods, assuming that all other parameters are kept unchanged.

Unless the following text says that a parameter has no effect on the performance, no general rules can be given. However, for some tests it may be possible to interpolate between or extrapolate from data points from samples having a different value for a particular product and or end- use parameter. It may also be possible to group products of a similar nature in order to derive a direct application rule.

The influence of a combination of parameter changes in reaction to fire test results may be inter-related. It is therefore recommended that the combination of product parameters which gives the lowest performance in the test be identified if possible. If the combination giving the worst performance cannot be identified, tests will need to be done on a series of combinations.

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A.2 Product parameters

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Thickness

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EN ISO 1716

The test method described in EN ISO 1716 is a test on the individual materials in a product and therefore the thickness of the product will not influence the fire performance in these tests.

EN ISO 1182

If the product has a thickness equal to or greater than 50 mm, thickness does not have an influence. Where the product is less than 50 mm thick, so that the test specimen has to be made by combining two or more layers together, thickness may have an influence.

EN 13823

The thickness of a product will have an influence on the fire performance when tested according to EN 13823. As the influence of thickness is very different for individual products, it is not possible to give any general rules. However, it may be possible to group products of similar nature, e.g. wood panels, in order to derive a direct application rule.

The SBI test equipment has a limit on the thickness of the test specimen of 200 mm. Therefore a test on a test specimen of 200 mm thickness prepared from a product, according to agreed mounting and fixing rules, is equally valid for the product of all greater thickness.

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EN ISO 11925-2

The thickness of a product will have an influence on the fire performance when tested according to EN ISO 11925-2.

The thickness of the test specimen is limited up to 60 mm in EN ISO 11925-2. Therefore a test on a test specimen of 60 mm thickness prepared from a product, according to agreed mounting and fixing rules, is equally valid for the product of all greater thickness.

EN ISO 9239-1

The thickness of a product will have an influence on the fire performance when tested according to EN ISO 9239-1. As the influence of thickness is very different for individual products, it is not possible to give any general rules. However, it may be possible to group products of similar nature in order to derive a direct application rule.

Density

EN ISO 1716

The fire performance parameters of this test are not influenced by density.

EN ISO 1182

The density of the product influences the fire performance parameters. As the influence of density is different for different products, it is not possible to give any general rules. However, for a given product it may be possible to interpolate between data points from samples of different density.

EN 13823

The density of a product will have an influence on the fire performance when tested according to EN 13823. As the influence of density is very different for individual products, it is not possible to give any general rules. However, for a given product it may be possible to interpolate between data points from samples of different density.

EN ISO 11925-2

The density of a product will have an influence on the fire performance when tested according to EN ISO 11925-2. As the influence of density is very different for individual products, it is not possible to give any general rules.

EN ISO 9239-1

The density of a product will have an influence on the fire performance when tested according to EN ISO 9239-1. As the influence of density is very different for individual products, it is not possible to give any general rules.

Colour

EN ISO 1716

Colour itself has no influence on the test result from EN ISO 1716, but the nature and amount of the colouring substance may have an influence. While no general rules are possible, it may be possible to develop a relationship based on organic content.