
**Vgradnja in pritrjevanje pri preskusih odziva proizvodov na ogenj v okviru
Direktive o gradbenih proizvodih**

Mounting and fixing in reaction to fire tests under the Construction Products Directive

Einbau und Befestigung bei Prüfungen zum Brandverhalten von Bauprodukten, die unter die Bauproduktenrichtlinie fallen

Montage et fixation en réaction a des essais au feu dans le cadre de la DPC
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Ta slovenski standard je istoveten z: CEN/TS 15447:2006

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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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SIST-TS CEN/TS 15447:2006**en**

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ICS 13.220.50

English Version

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This Technical Specification (CEN/TS) was approved by CEN on 20 May 2006 for provisional application.

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Foreword

This Technical Specification (CEN/TS 15447:2006) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, the secretariat of which is held by BSI.

This Technical Specification has been prepared by ad hoc working group 40 (“*Mounting and fixing in reaction to fire tests*”) of Technical Committee CEN/TC 127 (“*Fire safety in buildings*”).

This document has been prepared on request of the CEC as support for CEN Technical Committees involved in the production of technical specifications under the Construction Products Directive (CPD).

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

The Essential Requirements of the CPD apply to the construction works. Interpretative documents have been produced to form a link between the Essential Requirements and the performance characteristics of construction products incorporated in a permanent manner in construction works, i.e. in end-use application¹. The Essential Requirement concerned in this document is “Safety in case of fire”, and from that requirement the reaction to fire performance of construction products only is considered.

Technical specifications under the CPD, such as product standards, deal with construction products and their reaction to fire performance. For the assessment of reaction to fire performance the technical specifications use a set of supporting fire standards through reference to the classification standard EN 13501-1.

Five reaction to fire test methods have been developed for the purpose of testing construction products, including products incorporated within building elements. The procedure for classification is outlined in EN 13501-1 providing a choice of Euroclasses. Since EN ISO 1182 (“non-combustibility”) and EN ISO 1716 (“gross calorific potential”) deal with material characteristics and are thus independent of the end-use application of the product, the mounting and fixing² instructions presented apply to EN 13823, EN ISO 9239-1 and EN ISO 11925-2.

Technical specifications refer to EN 13501-1 for the assessment of reaction to fire performance. The EN 13501-1 refers to the five supporting test standards for determination of the relevant parameters. In principle a product standard should not refer directly to the test standards. However, where EN 13501-1 and the test standards do not fully define the mounting and fixing of a product in a test, the relevant product standard may add instructions to ensure that the test result is representative of the product behaviour in one or more end-use applications when exposed to a fire in the relevant fire scenario.

In the absence of standard mounting and fixing rules, a test result is only valid for the end-use application that is represented by the mounting and fixing (and other test configuration aspects) used in the test³. As a consequence all other end-use applications have to be tested. EN 13501-1, test standards and substrate standard EN 13238 contain some aspects of standardised mounting and fixing, to some degree limiting the number of tests to be performed to classify a product, which can lead to CE-marking. To limit the number of tests further, standardised mounting and fixing test arrangements may be introduced in the technical specifications. This may reduce the number of m&f test arrangements needed to cover all possible end-use applications to a few or even one.

A reaction to fire test method may in principle be used to assess the performance of (a) a material; (b) a product (a combination of one or more materials) without taking into account the incorporation of the product in the building; or (c) a product in its end-use application (i.e. taking into account the incorporation of the product in the building).

This frame work should be used by technical specification writers to develop further specific rules for product groups.

¹ In some documents “end-use application” is used as a global indication of the use of the product (e.g. use as wall lining or ceiling lining). The more detailed description of the way the product is incorporated in the building in the (global) “end-use application” is then referred to as “end-use condition” (including e.g. jointing, fixing and position in relation to adjacent products).

In this document the two terms are both covered by “end-use application”, in line with the definition given in EN 13501-1.

² In this document “mounting and fixing” is often abbreviated as “m&f”.

³ When direct field of application rules are defined it should read “only valid for the direct field of application of the test results”.

1 Scope

This guidance document is intended to provide basic rules, which are generally valid for the mounting & fixing of construction products in the reaction to fire test standards EN 13823, EN ISO 9239-1 and EN ISO 11925-2 which are referred to in the classification standard EN 13501-1. The mounting & fixing rules are intended to ensure that the reaction to fire test results in these tests are representative of the product behaviour in one or more end-use applications when exposed to a fire in the relevant fire scenario.

This document contains for each of the test methods the compulsory rules (given in EN 13501-1, EN 13238 and the relevant test standard) and recommendations for groups or (sub)families of products.

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 13238:2001, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

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

EN ISO 11925-2:2002, *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 or descriptions

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

NOTE Definitions and descriptions copied from other documents are marked as such with the reference between brackets.

In this document, terms may not always be used consistent with all quoted documents since the quoted documents are not always consistent between themselves. Where different wordings are used it is tried to follow the document(s) highest in hierarchy.

3.1

backing board

calcium silicate panel used to back the specimen that can be placed directly against a free-standing test specimen or at a distance from it. [EN 13823]

3.2

classification

the process defined in 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). [TC127 Resolution 331]

3.3

conditioning

exposure to a controlled atmosphere. [EN 13238]

3.4

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. [TC127 Resolution 331]

3.5

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]

3.6

end-use application parameter

aspect of the mounting and fixing arrangement of a product in 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

3.7

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. [TC127 Resolution 331]

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3.8

homogeneous product

product consisting of a single material, having uniform density and composition throughout the product [EN 13501-1]

3.9

intended use

refers to the role(s) that a product is intended to play in the fulfilment of the essential requirements of the CPD (definition in the IDs). The intended use is thus related to the function of a product in a construction works. [GP G]

3.10

field of application of a classification

refers to the range of end-use applications for which a given classification is considered to be valid. [GP G]

3.11

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]

3.12

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. [EN 13501-1]

3.13**material**

single basic substance or uniformly dispersed mixture of substances, e.g. metal, stone, timber, concrete, mineral wool with uniformly dispersed binder or polymers [EN 13501-1]

3.14**product**

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

3.15**product family**

refers to a set of generic products having a similar intended use (e.g. internal wall finishes, roof coverings). [GP G]

3.16**product sub-family**

refers to a subset of a product family, grouping together products having a similar nature (e.g. wall panels, flat and profiled roof sheets) or behaviour (e.g. products that melt or shrink under flame attack). [GP G]

3.17**product parameter**

aspect of a product (for example thickness, composition, density) which may vary and which may or may not affect the fire performance

3.18**product type**

a "type" may cover several versions of a product provided that the differences between the versions do not affect the level of safety and the other requirements concerning the performance of the product (c.f. initial type test and EC type examination). The direct field of application of a fire test will effectively define the type for fire safety purposes (e.g. products of a different colour will normally be of the same type). [GP G]

3.19**standard substrate**

product which is representative of the substrate used in end-use applications [EN 13501-1]

3.20**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. [EN 13501-1]

3.21**reaction to fire**

response of a product in contributing by its own decomposition to a fire to which it is exposed, under specified conditions [EN 13501-1]

3.22**reference scenario**

hazard situation used as a reference for a given test method or classification system. [EN 13501-1]

3.23**specimen**

piece of a product which is to be tested

NOTE 1 This can include the mounting technique used in its end-use application. This also can include an air gap and/or a substrate where appropriate. [EN 13823].

NOTE 2 The term “specimen” in EN 13823 is identical to the term “test specimen” used in this document.

3.24

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). [TC127 Resolution 331]

3.25

test specimen

piece of the product which is to be tested together with or without any substrate or treatment. [EN 13238]

4 General approach

4.1 Mounting and fixing of products in tests representing the end-use applications

The basic concept of the Construction Products Directive (CPD) is that construction products are tested in relation to their end-use application. The mounting and fixing (m&f) instructions are devoted to that.

The product, as put on the market, shall be submitted to the tests for the purpose of CE marking and hence classification. The mounting and fixing options apply and define the field of application of the classification. Generic products shall be tested and classified in a consistent manner throughout Europe.

Two options for mounting and fixing are available:

- standardised mounting & fixing to cover a group or possibly all end-use applications;
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- mounting & fixing representative of a specific end-use application.

Standardized m&f arrangement should be defined in a technical specification, respecting the general rules laid down in the supporting fire standards, to enlarge the field of application of a test result. For all standardized m&f arrangement specifications its field of application shall be defined, using the principle that the performance in the standardized m&f is equal to or lower than the performance in the end-use applications covered.

Without standardised mounting and fixing test arrangements all end-use applications should be tested. Using standardized m&f test arrangements this can be limited to a few or even one end-use application⁴.

In the tests, the product shall be tested so that, as far as possible, the classification relates to its performance in end-use application. Composite products are tested as such. However, if underlying layers can be exposed in the end-use application, the ignitability test shall be applied on the edge of the specimens so as to assess the ignitability of the underlying layers.

For products that are covered by another surface product in the end-use application, the thermal attack in the testing should be on the surface product of the assembly of products which is tested.

Where the end-use application is known the product may be tested accordingly or using standardised m&f arrangement. Products may be tested using a specific m&f test arrangement advised by the

⁴ In the case that a direct field of application of the test result is defined the number may already be limited.

producer; the applicability of the resulting classification is likely to be limited (to the end-use application(s) represented by the chosen m&f test arrangement).

Tests performed on “sliced” products (products with top layers removed) for reaction to fire information about the different layers, are not to be used for CE marking purposes.

4.2 Classification not representative of performance in end-use application

Some Member States require, for regulatory purposes, the classification for the product in isolation (not taking into account the incorporation of the product in the building, i.e. the end-use application). Accordingly Technical Committees may, if appropriate, devise simple standardised mounting and fixing arrangements for these tests.

4.3 Other ways of classifications

Where proof is provided that test results are not representative of the fire behaviour in one or more end-use applications, alternative m&f instructions for the currently used supporting fire tests, alternative fire tests, or even alternative reference scenario(s) and related test(s) (whether small, intermediate or large scale) may be used to assess the performance of the building products under consideration. The only procedure to call upon this alternative route for classification is outlined in Guidance document “G”, Clause 4. This procedure is open to “Member States (e.g. fire regulators), CEN/ CENELEC/ EOTA, European Industry Federations or the Fire Sector Group of Notified Bodies” [GP G], not for individual manufacturers.

NOTE None of the reaction to fire tests for classification are suitable for assessing directly full scale assemblies. For that purpose large-scale tests should be used. These large scale tests are primarily meant for risk-oriented assessment. This procedure is not to be used for CE-marking purposes unless it is the result of the procedure outlined in Guidance document “G”

4.4 Product parameters and end-use application parameters

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Standardized mounting and fixing instructions are based on the principle that the performance in such a m&f arrangement is equal or lower compared to that in the end-use applications covered.

To be able to make this comparison, the following product and end-use application parameters, and their variability, should be taken into account:

- thickness;
- density;
- colour;
- surface coating;
- composition of product;
- geometry and structure, e.g. shape, number and composition of layers;
- substrate;
- method of fixing;
- joints, type and position;
- air gaps;

- edges;
- product orientation;
- exposure to thermal attack.

The parameters of this list that may be part of the m&f instructions are discussed in this document. Parameters may be neglected if it is demonstrated that they have no effect on the reaction to fire performance or if they are not relevant for the product(s) under consideration.

5 Testing to EN 13823

5.1 Test specimen and mounting

5.1.1 General comments

The different aspects of mounting and fixing are dealt with separately below. EN 13823 is a medium scale test and, because of the effects of scaling on reaction to fire performance, it may not always be appropriate (or even possible) to introduce all features of real-scale mounting and fixing in order to achieve a test arrangement that adequately represents the product behaviour in one or more end-use applications when exposed to a fire in the relevant fire scenario.

5.1.2 Rules in the reaction to fire standards

EN 13501-1:2002, 6.3:

“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 may have different classifications relating to each application.”

“All construction products, except floorings, shall be tested in the vertical position for the purpose of classification.”

EN 13823:2002, 5.1, concerning dimensions:

“The corner specimen consists of two wings, designated the short and long wings.”

The maximum thickness of a specimen is 200 mm.

Sheet products shall have the following dimensions:

a) short wing: (495 ± 5) mm x (1 500 ± 5) mm,

b) long wing: (1 000 ± 5) mm x (1 500 ± 5) mm.

NOTE If additional products are used to construct the specimen (in accordance with EN 13823:2002, 5.3.2), the given dimensions refer to the total specimen dimensions.

“Specimens with a thickness of more than 200 mm shall be reduced to a thickness of 200 (+0/-10) mm by cutting away the unexposed surface.”

EN 13823:2002, 5.2.2, concerning non-flat products:

“Non-flat products shall be tested in such a way that not more than 30 % of a representative area of 250 mm” square “of the exposed surface area is more than 10 mm behind the vertical plane through the rear side of the U-profile. Non-flat products may be reshaped and/or may partly extend over the U-profile to the side of the burner to fulfil this requirement. A product shall not extend over the burner (i.e. maximum extension over the U-profile is 40 mm).

NOTE Products are mounted for testing against the rear side of the U-profile (see 5.3.1). A mounted, totally flat product is therefore positioned in the vertical plane against the rear of the U-profile. Since the position of the surface influences the heat received from the burner flames, the major parts of a non-flat product should not be far behind the vertical plane through the rear side of the U-profile.”

5.1.3 Recommendations

Products smaller than the test specimens:

If a product is not normally produced in a size large enough to accommodate the size of the test specimen it is necessary to prepare a special test specimen. Examples are ceiling tiles.

Horizontal or vertical joints should be positioned in accordance with clause 5.2.2 e) of EN 13823:2002, where such joints are required. Both wings should be built up using full-sized products starting at the lower corner that is intended to be nearest to the burner in testing. Where cutting of the product is necessary to engineer a horizontal or vertical joint in the specified position, installation of the product on an adjacent segment should then continue using full sized products after the joint.

This is illustrated in Figure 1 (Annex A), in which the dotted lines show the position of possibly cut product edges.

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5.2 Fixings/attachments and supports (standards.iteh.ai)

5.2.1 Influence of fixings/attachments and supports

Fixings/attachments and supports may influence the test result. Important parameters for these are composition, type, size, position and number.

If mechanical fixings are used, the distance chosen between fixings may influence the test result.

Examples:

- If a product separates from a support the product may start burning on both sides. A large number of fixings in this case may lead to a better test result.
- If the product separates from a support and falls apart, a large part of the product may fall away from the burner flame. A large number of fixings in this case may lead to a worse test result.

If an adhesive is used, the type and amount of adhesive, the way of application (full area, dots or waves) and curing are important. An adhesive may fail (and the product may become partly or fully detached from its support) or contribute to the fire.

Important parameters for a support are the mechanical deformation and the “heat sink” effect. If the support represents a rigid construction (e.g. concrete wall) mechanical deformation should be prevented.

Examples:

Mechanical deformation of a support will probably lead to deformation of the product tested; this may damage fixings and may open joints. Thin products in contact with a support may lose a significant amount of heat to the support limiting the progress of the flame front.