



SLOVENSKI STANDARD
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Test methods for determining the contribution to the fire resistance of structural members
- Part 7: Applied protection to timber members

Prüfverfahren zur Bestimmung des Beitrages zum Feuerwiderstand von tragenden
Bauteilen - Teil 7: Brandschutzmaßnahmen für Holzbauteile

Méthodes d'essai pour déterminer la contribution à la résistance au feu des éléments de
construction - Partie 7: Protection appliquée aux éléments en bois

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Ta slovenski standard je istoveten z: prEN 13381-7

ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
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Test methods for determining the contribution to the fire resistance of structural members - Part 7: Applied protection to timber members

Méthodes d'essai pour déterminer la contribution à la
résistance au feu des éléments de construction - Partie 7:
Protection appliquée aux éléments en bois

Prüfverfahren zur Bestimmung des Beitrages zum
Feuerwiderstand von tragenden Bauteilen - Teil 7:
Brandschutzmaßnahmen für Holzbauteile

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 127.

If this draft becomes a European Standard, 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.

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Foreword

This document (prEN 13381-7:2008) has been prepared by Technical Committee CEN/TC 127 "Fire safety in buildings", the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede ENV 13381-7:2002.

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 89/106/EEC.

This European Standard is one of a series of standards for evaluating the contribution to the fire resistance of structural members by applied fire protection materials. Other parts of this standard are:

Part 1: Horizontal protective membranes.

Part 2: Vertical protective membranes.

Part 3: Applied protection to concrete members.

Part 4: Applied protection to steel members.

Part 5: Applied protection to concrete/profiled sheet steel composite members.

Part 6: Applied protection to concrete filled hollow steel columns.

Annexes A and C are normative. Annexes B and D are informative.

Caution

The attention of all persons concerned with managing and carrying out this fire resistance test, is drawn to fact that fire testing can be hazardous and that there is a possibility that toxic and/or harmful smoke and gases can be evolved during the test. Mechanical and operational hazards can also arise during the construction of test elements or structures, their testing and the disposal of test residues.

An assessment of all potential hazards and risks to health shall be made and safety precautions shall be identified and provided. Written safety instructions shall be issued. Appropriate training shall be given to relevant personnel. Laboratory personnel shall ensure that they follow written safety instructions at all times.

The specific health and safety instructions contained within this Standard shall be followed.

1 Scope

This Part of this European Standard specifies a test method to be followed for determining the contribution of fire protection systems to the fire resistance of structural timber members.

Such fire protection systems include claddings, sprayed fire protection and coatings.

The method is applicable to all fire protection systems used for the protection of timber members. These can be fixed directly, totally or in part, to the timber member and can include an air gap between the fire protection system and the timber member, as an integral part of its design.

Evaluation of timber constructions protected by horizontal or vertical protective membranes are the subject of prEN 13381-1 or prEN 13381-2 respectively.

The test method is applicable to the determination of the contribution of fire protection systems to the fire resistance of loadbearing timber structural members and non-loadbearing parts of the works, including floors, roofs, walls, beams and columns. It is also applicable to timber structural members incorporating insulating materials between the timber members, e.g. between timber joists in floor constructions.

The test method and its assessment procedure is designed to permit direct application of the results to cover a range of thicknesses of the applied fire protection material.

This European Standard contains the fire test which specifies the test to be carried out to determine the ability of the fire protection system to delay the temperature rise throughout the timber member, to determine the ability of the fire protection system to remain coherent and fixed to the timber member and to provide data of the temperature profile throughout the timber test member, when exposed to the standard temperature/time curve according to the procedures defined herein.

In special circumstances, where specified in national building regulations, there can be a need to subject reactive protection material to a smouldering curve. The test for this and the special circumstances for its use are detailed in Annex A.

The fire test methodology makes provision for the collection and presentation of data which can be used as direct input to the calculation of fire resistance of timber members in accordance with the procedures given in EN 1995-1-2.

A description of the relationship of this test method and the assessment of the results obtained therefrom to EN 1995-1-2 and guidelines for the use of this test method in accordance with that standard are given in Annex B.

This European Standard also contains the assessment which prescribes how the analysis of the test data shall be made and gives guidance to the procedures by which interpolation shall be undertaken.

The limits of applicability of the results of the assessment arising from the fire test are defined, together with permitted direct application of the results to different timber constructions over the range of thicknesses of the applied fire protection system tested.

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).

EN 1363-1, *Fire resistance tests – Part 1: General requirements*

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

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 1995-1-2, *Eurocode 5: Design of timber structures – Part 1-2: General rules – Structural fire design*

EN 338, *Structural timber – Strength classes*

EN 312, *Particleboards – Specifications*

ISO 8421-2, *Fire protection – Vocabulary – Part 2: Structural fire protection*

ISO 13943, *Fire safety – Vocabulary (ISO 13943:1999)*

3 Terms and definitions, symbols and units

3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1363-1, EN ISO 13943 and ISO 8421-2, together with the following, apply.

3.1.1

timber structural member

element of building construction which may be loadbearing or non-loadbearing and which is mainly constructed from solid timber and/or other wood based products

3.1.2

fire protection material

material or combination of materials applied to the surface of a timber structural member for the purpose of increasing its fire resistance

3.1.3

passive fire protection materials

materials which do not change their physical form upon heating, provide fire protection by virtue of their physical or thermal properties. They may include materials containing water which, on heating, is removed to produce cooling effects

3.1.4**reactive fire protection materials**

materials which are specifically formulated to provide a chemical reaction upon heating such that their physical form changes and in so doing provide fire protection by thermal insulative and cooling effects

3.1.5**fire protection system**

fire protection material together with a prescribed method of attachment to a timber structural member. The fire protection system may include multiple layers of materials and multiple combinations of materials

3.1.6**fire protection**

protection afforded to the timber member by the fire protection system such that the rise of temperature of the timber and fixings is limited or delayed throughout the period of exposure to fire

3.1.7**test specimen**

complete assembly of the timber test member plus the fire protection system under test. Within this test method, several timber beams representative of timber in various constructional environments in a structural building member, may be combined into a single test specimen

3.1.8**stickability**

ability of a fire protection material to remain sufficiently coherent and in position for a well defined range of deformations, and furnace and test specimen surface temperatures, such that its ability to provide fire protection is not significantly impaired

3.1.9**charring depth**

distance from the original surface of the timber member to the char line. The char line is the border-line between char layer and the residual cross section

3.2 Symbols and units

Symbol	Unit	Designation.
t	min	Time.
t_{pr}	min	The failure time of the fire protection system, i.e. the time when the temperature on the surface of the timber test member (interface between timber and fire protection or air gap beneath the fire protection) reaches 300 °C.
$t_{300,prot}$	min	Time at which the temperature indicated by a thermocouple placed at the interface between the timber test member and the fire protection system, or at a specified point within a protected timber test member, reaches 300 °C.
$t_{300,unprot}$	min	Time at which the temperature indicated by a thermocouple on the surface of an unprotected timber test member, or at a specified point within an unprotected timber test member, reaches 300 °C.
t_{test}	min	Time of termination of test.
d_p	mm	Thickness of the fire protection system. In the case of two or more layers of fire protection material d_p is the sum of the thicknesses.
d_{char}	mm	Charring depth.
β	mm/min	Notional charring rate from EN 1995-1-2 excluding the effect of roundings at arrises.

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β_0	mm/min	Notional charring rate from EN 1995-1-2 including the effect of roundings at arrises.
β'	mm/min	Actual unprotected charring rate determined by testing.
β''	mm/min	Actual protected charring rate determined by testing.

4 Test equipment**4.1 General**

The furnace and test equipment shall be as specified in EN 1363-1.

4.2 Furnace

The furnace shall be designed to permit the dimensions of the test specimen to be exposed to heating to be as specified in 6.2 and its installation to be as specified in Clause 7.

4.3 Loading equipment

Loading equipment shall conform to that specified in EN 1363-1. The loading system shall permit loading of the magnitude defined in 5.3 to be applied.

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5 Test conditions**5.1 General**

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The tests shall be carried out as described in EN 1363-1 unless otherwise stated.

For a fire protection system to be applied to timber floors, walls, beams and columns, both floor and beam tests shall be performed according to EN 1365-2 and EN 1365-3 respectively.

For a fire protection system to be applied only to timber floors and walls, then floor tests shall be performed according to EN 1365-2.

For a fire protection system to be applied only to timber beams and columns, then beam tests shall be performed according to EN 1365-3.

This test method is written in terms of this universal application to all constructions.

Wall or column tests only may be performed (according to EN 1365-1 or EN 1365-4 respectively) but the results shall be restricted to that tested.

The EN 1365 test methods shall be slightly modified for the purposes of this test in order that the following information may be obtained and monitored:

- the behaviour of the fire protection system and its stickability;
- the temperature of the timber behind the fire protection system and the temperature throughout the depth of the timber.

5.1.1 The modified prEN 1365 large scale test

The EN 1365 test method(s) and test specimen(s) appropriate to the use of the fire protection material, specified by the sponsor, shall be followed.

The temperature performance, stickability and general behaviour of the fire protection system, under load shall be examined by incorporation into the test specimen an assembly or assemblies comprising particleboard laminate together with additional instrumentation.

5.1.2 The small scale test

Small scale tests shall be performed upon scaled down test assemblies from that given in 5.1.1.

Small scale tests shall be carried out on the same furnace as that used for the large scale tests in 5.1.1 and in horizontal orientation, unless the result is to be restricted (see 5.1).

Such tests shall be used to give correlation between protected and unprotected timber structures and to provide additional information.

5.2 Support and restraint conditions

Test specimens shall be supported according to the relevant large scale test.

5.3 Loading conditions

Loading shall be applied to full size test specimens according to the relevant large scale test.

The magnitude of the load shall be calculated, taking account of the differing strength and deformation properties induced by included particle board laminates, to be that required to give the necessary deflection according to the appropriate EN 1365 test.

The small scale test shall be performed unloaded.

6 Test specimens

6.1 Number

6.1.1 General

The appropriate test or tests to be carried out shall be as given in 5.1. For each EN 1365 test method to be used, if the fire protection material is available in more than one thickness then following shall be carried out:

- a) Test result to be applicable to floors and beams according to EN 1365-2 and EN 1365-3 (and therefore to walls and columns according to 5.1).
 - one large floor test at minimum thickness;
 - one large floor test at maximum thickness;
 - one large beam test at minimum thickness;
 - one large beam test at maximum thickness;
 - one small floor test at minimum thickness;

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- one small floor test at maximum thickness;
 - one unprotected small scale test.
- b) Test result to be applicable only to floors according to EN 1365-2 (and therefore to walls according to 5.1).
- one large floor test at minimum thickness;
 - one large floor test at maximum thickness;
 - one small floor test at minimum thickness;
 - one small floor test at maximum thickness;
 - one unprotected small scale test.
- c) Test result to be applicable only to beams according to EN 1365-3 (and therefore to columns according to 5.1).
- one large beam test at minimum thickness;
 - one large beam test at maximum thickness;
 - one small floor test at minimum thickness;
 - one small floor test at maximum thickness;
 - one unprotected small scale test.

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For very restricted application to walls or columns (see 5.1) the same numbers of tests shall be carried out with walls or columns replacing floors or beams.

For each EN 1365 test method to be used, if the fire protection material is available in one thickness or if the sponsor specifies limitation to one commercially appropriate thickness only, then the two tests at maximum and minimum thickness shall be replaced by a single test at that thickness. The results of the assessment shall be restricted to that tested.

Test constructions carrying particleboard test specimens shall be built according to 6.3 and installed according to Clause 7.

6.1.2 Fire protection system variations

Additional particleboard test specimens shall be tested to provide further test data for the fire protection system when it is required to consider:

- different construction and fixing variables: One particleboard specimen per variable shall be tested in both large and small scale tests at maximum fire protection thickness;
- multilayer fire protection systems: One particleboard specimen per variable shall be tested in both large and small scale tests;
- other intermediate fire protection thicknesses between maximum and minimum thickness. One small scale test per thickness variable to be considered;
- alternative and intermediate thicknesses of multiple layer combinations. One small scale test per combination and combination thickness to be considered;