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

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NATIONAL FOREWORD

See Eesti standard EVS-EN 13381-5:2014 sisaldab Euroopa standardi EN 13381-5:2014 inglisekeelset teksti.	This Estonian standard EVS-EN 13381-5:2014 consists of the English text of the European standard EN 13381-5:2014.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 12.11.2014.	Date of Availability of the European standard is 12.11.2014.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 13.220.50, 91.080.01

EUROPEAN STANDARD

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EN 13381-5

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English Version

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

Méthodes d'essai pour déterminer la contribution à la résistance au feu des éléments de construction - Partie 5 : Protection appliquée aux dalles mixtes béton/tôle d'acier profilée

Prüfverfahren zur Bestimmung des Beitrages zum Feuerwiderstand von tragenden Bauteilen - Teil 5: Brandschutzmaßnahmen für profilierte Stahlblech/Beton-Verbundkonstruktionen

This European Standard was approved by CEN on 13 September 2014.

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-CENELEC Management Centre or to any CEN member.

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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 13381-5:2014) 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 May 2015 and conflicting national standards shall be withdrawn at the latest by May 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes ENV 13381-5:2002.

In comparison with the previous edition, the entire document has been revised.

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

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 passive protection products to steel members*;

— *Part 6: Applied protection to concrete filled hollow steel columns*;

— *Part 7: Applied protection to timber members*;

— *Part 8: Applied reactive protection to steel members*.

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 will be made and safety precautions will be identified and provided. Written safety instructions will be issued. Appropriate training will be given to relevant personnel. Laboratory personnel will ensure that they follow written safety instructions at all times.

The specific health and safety instructions contained within this standard will be followed.

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

1 Scope

This European Standard specifies a test method for determining the contribution of fire protection systems to the fire resistance of structural concrete/profiled sheet steel composite members or slabs. The concrete can be lightweight, normal-weight or heavy-weight concrete and of strength classes 20/25 (LC/C/HC) to 50/60 (LC/C/HC).

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

The test method is applicable to all fire protection materials used for the protection of concrete/steel composite members or slab and includes sprayed materials, coatings, cladding protection systems and multi-layer or composite fire protection materials, with or without a cavity between the fire protection material and the concrete/steel composite members or slab.

This European Standard contains the fire test which specifies the tests which will be carried out to determine the ability of the fire protection system to remain coherent and fixed to the composite member and to provide data on the temperatures of the steel sheet, throughout the depth of the concrete (for extended application purposes) and the unexposed surface of the concrete, 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 concrete/steel composite members in accordance with the procedures given in EN 1994-1-2.

This European Standard also contains the assessment which prescribes how the analysis of the test data needs to be made and gives guidance to the procedures by which interpolation needs to 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 steel/concrete composite structures, steel types and thicknesses, concrete densities, strengths, thicknesses and production techniques over the range of thicknesses of the applied fire protection system tested.

2 Normative references

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

EN 206, *Concrete - Specification, performance, production and conformity*

EN 823, *Thermal insulating products for building applications - Determination of thickness*

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

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

EN 1992-1-1, *Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings*

EN 1994-1-2, *Eurocode 4 - Design of composite steel and concrete structures - Part 1-2: General rules - Structural fire design*

EN 10346, *Continuously hot-dip coated steel flat products - Technical delivery conditions*

EN 12467, *Fibre-cement flat sheets - Product specification and test methods*

EN ISO 3251, *Paints, varnishes and plastics - Determination of non-volatile-matter content (ISO 3251)*

EN ISO 13943, *Fire safety - Vocabulary (ISO 13943)*

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

3 Terms and definitions, symbols and units

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1363-1, EN ISO 13943, ISO 8421-2, EN 206 and the following apply.

3.1.1
concrete/steel composite member or slab (generally referred to as slab)
element of building construction which is loadbearing and is fabricated from a profiled steel sheet lower surface and a concrete upper layer, which may contain steel reinforcing bars

Note 1 to entry: Profiled steel sheet is specified in EN 10346 and concrete according to EN 206.

3.1.2
fire protection material
material or combination of materials applied directly or by means of fixing system to the surface of a concrete/steel composite slab for the purpose of increasing its fire resistance

3.1.3
passive fire protection materials
materials which do not change their physical form on heating, providing fire protection by virtue of their physical or thermal properties and which may include materials containing water which, on heating, evaporates 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 provides 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 the structural concrete/steel composite slab

3.1.6
fire protection
protection afforded to the concrete/steel composite slab by the fire protection system such that the temperature throughout the depth of the structural slab and upon any steel reinforcing bars within it is limited throughout the period of exposure to fire