

SLOVENSKI STANDARD

SIST EN 1365-3:2001

01-februar-2001

Preskusi požarne odpornosti nosilnih elementov - 3. del: Nosilci

Fire resistance tests for loadbearing elements - Part 3: Beams

Feuerwiderstandsprüfungen für tragende Bauteile - Teil 3: Balken

Essais de résistance au feu des éléments porteurs - Partie 3: Poutres

Ta slovenski standard je istoveten z: EN 1365-3:1999

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ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
91.060.99	Drugi stavbni elementi	Other elements of buildings

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 1365-3

December 1999

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English version

Fire resistance tests for loadbearing elements - Part 3: Beams

Essais de resistance au feu des éléments porteurs - Partie
3: Poutres

Feuerwiderstandsprüfungen für tragende Bauteile - Teil 3:
Balken

This European Standard was approved by CEN on 18 February 1999.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard 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 June 2000, and conflicting national standards shall be withdrawn at the latest by June 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

EN 1365 ‘Fire resistance tests for loadbearing elements’ consists of the following

Part 1: Walls

Part 2: Floors and roofs

Part 3: Beams

Part 4: Columns

Part 5: Balconies (in course of preparation)

Part 6: Stairs and walkways (in course of preparation)

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Introduction

Caution

The attention of all persons concerned with managing and carrying out this fire resistance test, EN1365-3 is drawn to the fact that fire testing may be hazardous and that there is a possibility that toxic and/or harmful smoke and gases may be evolved during the test. Mechanical and operation hazards may also arise during the construction of the test elements or structures, their testing and 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.

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1 Scope

This Part of EN 1365 specifies a method for determining the fire resistance of beams with or without applied fire protection systems and with or without cavities. This Standard is used in conjunction with EN1363-1.

Beams which are part of a floor construction are tested with the floor construction as described in EN 1365-2 and are subject to evaluation of integrity and insulation.

General guidance on this method of test is given in annex A.

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 test 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.

EN 1363-1	Fire resistance tests - Part 1: General requirements
EN 1363-2	Fire resistance tests - Part 2: Alternative and additional procedures
EN 1365-2	Fire resistance tests for loadbearing elements - Part 2: Floors and roofs
prEN ISO 13943	Fire safety - Vocabulary (ISO/DIS 13943:1998)

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3 Definitions, symbols and designations

3.1 Definitions

For the purposes of this Part of EN 1365, the definitions given in EN1363-1 and prEN ISO 13943, together with the following, apply:

3.1.1 supported construction: The actual floor or roof that will be supported by beams in the building.

3.2 Symbols and designations

Symbol	Unit	Designation
L_{exp}	mm	Length of test specimen exposed to heating
L_{sup}	mm	Length of test specimen between centres of supports (this is equivalent to 'L' in EN 1363-1)
L_{spec}	mm	Length of test specimen

4 Test equipment

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

5 Test conditions

The heating conditions, the furnace atmosphere and loading conditions shall conform to those specified in EN 1363-1 or, if applicable, EN 1363-2. The pressure condition shall be established 100 mm below the underside of the furnace cover slab.

6 Test specimen

6.1 Size

For simply supported beams, when full size is larger than the size which can be accommodated in the furnace, then the exposed length [L_{exp}] shall be not less than 4 m. The span between the supports [L_{sup}] shall be the exposed length plus up to half the length of the bearing at each end. The length of the bearing shall be selected so that the difference between [L_{sup}] and [L_{exp}] is kept to a minimum or as in practice, whichever is the smaller. The length of the specimen [L_{spec}] shall be the exposed length plus up to a maximum of 200 mm at each end. A general arrangement of a beam in the furnace is shown in figure 1.

Simply supported beams which in use are greater than twice the furnace length shall be tested under conditions to match either the maximum shear force or the maximum bending moment, whichever is the most critical in use. If this cannot be identified then both conditions shall be tested.

For restrained beams, a 4 m minimum span is inadequate, because only a proportion of the span would be expected to be in a bending mode, the remainder being partially supported by the restraint mechanism. Therefore when testing a restrained beam a longer span in which at least 4 m is subjected to positive bending moments shall be selected. If X% of the beam is expected to be in positive bending mode then the overall length shall be given by $L_{exp} = 4 \times 100/X$ m.

6.2 Number

For a given set of support, restraint, loading and exposure conditions at least one test specimen shall be tested.

6.3 Design

6.3.1 General

When selecting a test specimen or designing a representative construction, consideration shall be given to the following:

6.3.2 Joints

If a beam incorporates a mechanical joint along its length, this shall be incorporated as in practice or at mid-span. When joints occur in fire protective claddings, test specimens incorporating such protection shall include representative joints.

6.3.3 Exposure

If a beam in practice is only exposed to the effects of fire on three sides, e.g. where the top surface is supporting a floor or roof, it shall be tested with an associated construction representative of the supported construction used in practice.

6.3.4 Associated construction

If the nature of the floor or roof is not known then an associated construction shall be provided to the top surface. The associated construction shall be manufactured in discrete sections, with discontinuous reinforcements where used, to avoid any composite action between it and the beam which might give additional strength or stiffness to the beam. It shall be made from aerated concrete slabs having a density of $(650 \pm 200) \text{ kg/m}^3$, each having a maximum width of 60 mm and a thickness of $(150 \pm 25) \text{ mm}$, see figure 2.

The width of the associated construction placed symmetrically along the axis of the beam shall be at least three times beam width or 600 mm whichever is greater. The actual dimension selected will depend on the furnace design and where appropriate the distance between the beam and the furnace roof.

6.3.5 Fire protection material

If fire protection material is applied or fixed to the beam it shall extend over the length of the beam that is to be exposed to the heating conditions of the test. Where a void is created within the fire protection system (e.g. hollow box protection to steel beams) this void shall not be vented to outside the furnace chamber.

6.4 Construction

The test specimen shall be constructed as described in EN 1363-1.

6.5 Verification

Verification of the test specimen shall be carried out as described in EN 1363-1.

7 Installation of test specimen

7.1 General

The test specimen shall be installed, as far as possible, in a manner representative of its use in practice.

The extremities of the support of the beam shall be sealed by resilient material of adequate fire performance to prevent the leakage of hot gases and any influence on end conditions during the test.

Any joints in the associated construction and any furnace closures shall be sealed with a resilient material to prevent leakage of hot gases during the test.

The ends of the beam extending beyond the furnace chamber, for support purposes, shall be insulated either by the applied fire protection material itself or by wrapping with a single thickness of $(100 \pm 10) \text{ mm}$ thick mineral wool with a density of $(120 \pm 30) \text{ kg/m}^3$.

The beam shall be mounted horizontally on top of the furnace, in its load application frame if used, such that its exposure to the test from three sides is similar to that which would normally occur in practice.

When testing beams to four-sided exposure the minimum distance from the top of the beam to the furnace cover slab shall be at least equal to the width of the beam.

7.2 Supporting construction

Supporting constructions are not used in the fire resistance testing of beams.