



# SLOVENSKI STANDARD

## SIST EN 1365-4:1999

01-december-1999

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### Preskusi požarne odpornosti nosilnih elementov – 4. del: Stebri

Fire resistance tests for loadbearing elements - Part 4: Columns

Feuerwiderstandsprüfungen für tragende Bauteile - Teil 4: Stützen

Essais de résistance au feu des éléments porteurs - Partie 4: Poteaux

Ta slovenski standard je istoveten z: **EN 1365-4:1999**

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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  
EUROPÄISCHE NORM

EN 1365-4

August 1999

ICS 13.220.50

English version

## Fire resistance tests for loadbearing elements - Part 4: Columns

Essais de résistance au feu des éléments porteurs - Partie  
4: Poteaux

Feuerwiderstandsprüfungen für tragende Bauteile - Teil 4:  
Stützen

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  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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APPROVED FOR PUBLICATION  
 COUNCIL OF THE UNION OF CHEMISTS  
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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 BSL

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 February 2000, and conflicting national standards shall be withdrawn at the latest by February 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.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the Construction Products Directive.

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 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 EN1365 specifies a method for determining the fire resistance of columns when fully exposed to fire on all sides. This Standard is used in conjunction with EN1363-1.

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 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.

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 on loadbearing elements - Part 1: Walls
prEN ISO 13943	Fire safety - Vocabulary (ISO/DIS 13943:1998)

## 3 Definitions

For the purpose of this Part of EN 1365, the definitions given in EN 1363-1 and prEN ISO 13943, together with the following, apply:

**3.1 loading platens:** Flat plates used between the loading equipment at each end of the column to ensure correct application of the applied load.

**3.2 controlled eccentricity:** A load applied non-axially at a defined distance from the vertical axis of the column.

## 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 conditions shall be established 100 mm below the underside of the top of the furnace.

## 6 Test specimen

### 6.1 Size

The test specimen shall be full size for columns with a height of up to 3 m. For elements that have a height in excess of 3 m, the size of specimen exposed to the heating conditions of the furnace shall be not less than 3 m. The overall height shall not exceed the heated height by more than 300 mm at each end. This extra height shall be minimized to prevent conduction of heat from the specimen under test and shall be used for locating the column into the loading equipment and also for distancing the loading equipment from the furnace atmosphere.

### 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

Test specimens representing columns shall be tested in one or more of the following end conditions:

- a) with one end pin-jointed and one end fully restrained;
- b) with two ends fully rotationally restrained;
- c) any other boundary condition more representative of the end use. (see figure 1).

The extremities of the support of the column 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.

When selecting a test specimen, consideration shall be given to the following points.

- a) Provision shall be made for the proper positioning and alignment of the test specimen in the equipment and for ensuring uniform distribution of the load over the ends of the test specimen.
- b) The ends of the test specimen shall be designed and detailed for the proper transmission of the test load from the loading platens to the test specimen with the required conditions of fixity. The load bearing faces, at top and bottom of the column, shall be parallel and perpendicular to the axis of the column.
- c) To protect the loading equipment against heat, collars shall be attached at each end of the test specimen. These shall provide an adequate seal with the furnace walls and shall be suitably attached and supported so that they remain effective and in position throughout the heating period. The method used to provide the seal shall allow the test specimen to move within the furnace walls without significantly affecting the load transmitted from the loading equipment to the test specimen or the fixity at the ends of the specimen.
- d) When joints occur in fire protection claddings, any specimen that incorporates such protection shall include at least one representative joint situated approximately at mid height.



## 6.4 Construction

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

## 6.5 Verified

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

## 7 Installation of test specimen

### 7.1 General

The column shall be mounted vertically in the furnace to enable it to be exposed to the heating conditions specified in either EN 1363-1 or, if applicable, EN 1363-2. An example of the test arrangement is shown in figure 1.

### 7.2 Supporting constructions

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

### 7.3 End conditions

**7.3.1** Where a pin-joint condition is specified, this can be represented either by placing a spherical hinge or cylindrical roller between one end of the column and the loading equipment. If a cylindrical roller is used its axis shall be parallel to the weak axis of the column.

The hinge shall be mounted between two platens: one attached to the loading equipment, the other in contact with the column, in order to improve the load distribution over the cross section of the column.

The hinge shall be accurately located along the axis of the column so as to allow a controlled eccentricity of loading of  $h/500$  or 7 mm, whichever is the lower, where  $h$  is the total height of the column between supports.

**Note:** Special care should be taken to avoid friction in the hinges.

**7.3.2** Where fixed end conditions are specified a good contact shall be ensured between the loading platens and the ends of the column and precautions shall be taken to ensure full restraint throughout the whole of the test.

## 8 Conditioning

The test construction shall be conditioned as described in EN 1363-1.

## 9 Application of instrumentation

### 9.1 Furnace thermocouples (plate thermometers)

Plate thermometers shall be provided in accordance with EN 1363-1.

a) At least six plate thermometers shall be placed in pairs inside the furnace on opposite sides of the specimen at  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and  $\frac{3}{4}$  of the column height (exposed length).

b) The plate thermometers shall be positioned such that at the commencement of heating they are  $(100 \pm 50)$  mm from the respective faces of the column, and they shall be maintained at this distance during the test as far as possible.

c) The plate thermometers shall be oriented so that side 'A' faces the walls of the furnace, i.e. the insulated parts of the plate thermometers shall face towards the column.