SLOVENSKI STANDARD
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Preskusi požarne odpornosti nosilnih elementov – 6. del: Stopnice

Fire resistance tests for loadbearing elements - Part 6: Stairs

Feuerwiderstandsprüfungen für tragende Bauteile - Teil 5: Treppen

Essais de résistance au feu des éléments porteurs - Partie 5: Escaliers

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Essais de résistance au feu des éléments porteurs - Partie 5: Escaliers

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This European Standard was approved by CEN on 9 July 2004.

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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.

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Foreword

This document (EN 1365-6:2004) 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of an identical text or by endorsement, at the latest by May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

This 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 parts:

Part 1: Walls,

Part 2: Floors and roofs,

Part 3: Beams,

Part 4: Columns,

Part 5: Balconies and walkways,

Part 6: Stairs.

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

Introduction

The purpose of this test is to measure the ability of a representative specimen of a stair or a part of it to maintain its loadbearing capacity when exposed to fire according to EN 1363-1.

Caution

The attention of all persons concerned with managing and carrying out this fire resistance test EN 1365-6 is drawn to the 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 the test elements or structures, their testing and disposal of test residues.

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

1 Scope

This Part of EN 1365 specifies a method for determining the fire resistance of stairs, with or without applied fire protection systems in respect of loadbearing capacity and with no separating function. This document is used in conjunction with EN 1363-1.

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 1363-1:1999, *Fire resistance tests — Part 1: General requirements*

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 ISO 13943:2000, *Fire safety — Vocabulary (ISO 13943:2000)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1363-1:1999 and EN ISO 13943:2000, and the following apply.

3.1
stair
succession of horizontal stages (steps or landings) rising at a pitch which makes it possible to pass on foot to other levels

NOTE Figures of different stairs are given in Annex A.

3.2
landing
level platform at the end of or between two flights of stairs. It can be part of the stair or the floor

3.3
intermediate landing
landing inserted between two floors

3.4
string
inclined member supporting the end of steps

3.5
step
part of a stair consisting of a tread and possibly a riser

3.6
riser
part closing the front face of the step

3.7
tread
horizontal component or the upper surface of a step

3.8
balustrade
railing supported by posts or pillars forming a parapet to a stair and designed to prevent the user falling over the side

3.9
flight
unbroken series of steps between two landings

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.

The pressure condition shall be established 100 mm below the underside of the furnace cover slab.

6 Test specimen

6.1 General

The test specimen is the complete stair or part of the stair chosen to represent the most onerous conditions of failure.

If the fire resistance of a component will not be negatively influenced by the complete system, then the complete stair can be represented by a part of the complete system and tests may be carried out on that part according to EN 1365-2, EN 1365-3 and/or EN 1365-4.

6.2 Size

The test specimen shall be full size unless the actual size is larger than can be accommodated in the furnace. When the actual size cannot be accommodated in the furnace, the height of the test specimen shall be at least 3 m and the dimensions (length and width) of the horizontal projection at least 4 m $\times$ 3 m.

A part of a stair shall be tested in such a way that the result is representative for the entire construction. A string shall be tested as a beam with a declination as in practice with the size specified in EN 1365-3. A step shall be tested with maximum span as a single supported beam with the size specified in EN 1365-3. A landing shall be tested as a floor with the size specified in EN 1365-2. A column shall be tested with the size specified in EN 1365-4.

6.3 Number

One test specimen shall be tested for a given set of support, restraint, loading and exposure conditions.

6.4 Design

When testing stairs, part of stairs or components, fixings, joints, connections, etc. (e.g. step to string, step to tensile member) shall be incorporated as in use. If the balustrade is part of the loadbearing system it shall be included in the test specimen (see Figure A.3).

6.5 Exposure

The test specimen shall be exposed to fire according to its installation position in the building and the heating conditions shall be as specified in Clause 5. When testing components of a stair, a string, a step and a column, these shall normally be tested exposed to fire on four sides and a landing exposed from both sides. When testing a full stair specimen which has no separating function, the specimen shall be tested exposed to fire from all sides.

6.6 Construction

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

6.7 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 (a stair, a part of a stair or a component) shall be installed, as far as practicable, in a manner representative of its use in practice.

Where in the test configuration the free edges are exposed, where they would not be exposed in practice, these edges shall be sealed with mineral wool and/or other materials according to the sponsor.

The ends of the test specimen extending beyond the furnace chamber, for support purposes, shall be insulated either by any applied fire protection material or by wrapping with a single thickness of (100 ± 10) mm thick mineral wool with a density of (120 ± 30) kg/m^3.

For specimens including a landing, the minimum distance from the top of the landing to the furnace cover slab shall be 500 mm or in case of components at least equal to the width of the string or the step.

Examples of test arrangements are given in Annex A.

7.2 Loading and restraint

Test specimens representing a stair or parts of stair shall be tested either to simulate end use boundary conditions or, where these conditions cannot be specified, the specimen shall be tested simply supported.

The magnitude and the distribution of the load shall be such that the maximum stresses produced are representative of or higher than those expected in practice.

All stairs shall be tested to loads determined in accordance with EN 1363-1. When testing total systems, load shall be applied by single load points in the middle of the steps and/or landings.

NOTE If it is assumed that the stair or the component of stair is exposed to fire on four sides, it should be noted that the magnitude of load to be applied is only that representing the dead load, because it can be assumed that there will be no live load during the fire exposure.

8 Conditioning

The test specimen 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. When testing a stair or part of a stair there shall be at least two plate thermometers for each square metre of the area of the flight and the landing. They shall be evenly distributed in the area of the stair. There shall be at least two plate thermometers for each metre length, or part of exposed length of the specimen. They shall be evenly distributed along the length of the test specimen. A minimum of six plate thermometers shall be used.

At each location given above, the plate thermometers shall be positioned (100 ± 50) mm below the plane of the underside of the test specimen and (100 ± 50) mm from the edges on each side of the test specimen. For test specimens exposed to fire from below only, the plate thermometers shall be positioned underneath the specimen (100 ± 50) mm below the plane of the underside of the test specimen and at a distance of 450 mm from the edges of the specimen.

For strings which are deeper than 500 mm the plate thermometers shall be positioned as above, but at mid height of the string instead of below the underside.

The plate thermometers shall be orientated so that for half their number side 'A' faces the floor of the furnace and for the other half side 'A' faces the side walls of the furnace. The distribution of the different orientations shall be such that there shall be equal numbers facing the floor and the wall on each side of the test specimen.

9.2 Pressure

Pressure within the furnace shall be measured as described in EN 1363-1.

9.3 Deflection

For simply supported constructions the vertical deflection of the specimen shall be measured at mid span.

For constructions for which an asymmetrical deflection might be expected, deflection measurements shall be taken at more than one position in order to determine the maximum deflection. The zero point for deflection is measured after applying the load at the beginning of the test and before commencement of heating.

When testing specimens fully engulfed in fire, it is not always possible to measure the deflection.

10 Test procedure

The test shall be carried out using the equipment and procedures in accordance with EN 1363-1 and, if appropriate, EN 1365-2, EN 1365-3 and EN 1365-4.

11 Performance criteria

The fire resistance of the stair system or its components shall be judged against the loadbearing capacity criterion as specified in EN 1363-1.

When the specimen is tested exposed to fire from above and from below, and the deflection cannot be measured, failure to support the load is deemed to have occurred when the specimen collapses.

12 Test report

In addition to the items required by EN 1363-1, reference that the test was carried out in accordance with EN 1365-6 shall be included in the test report.

13 Field of direct application of test results

The test results are applicable to similar (same materials and structural design) untested stairs or their parts providing that the maximum stresses, when calculated on the same basis as the test load, are not greater than those occurring in the test specimen. This is only applicable provided that no changes are made to any applied fire protection.