



SLOVENSKI STANDARD

SIST EN 1365-1:2013

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Nadomešča:
SIST EN 1365-1:1999

Preskusi požarne odpornosti nosilnih elementov - 1. del: Stene

Fire resistance tests for loadbearing elements - Part 1: Walls

Feuerwiderstandsprüfungen für tragende Bauteile - Teil 1: Wände

Essais de résistance au feu des éléments porteurs - Partie 1 : Murs

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ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
91.060.10	Stene. Predelne stene. Fasade	Walls. Partitions. Facades

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English Version

Fire resistance tests for loadbearing elements - Part 1: Walls

Essais de résistance au feu des éléments porteurs - Partie
1: MursFeuerwiderstandsprüfungen für tragende Bauteile - Teil 1:
Wände

This European Standard was approved by CEN on 13 July 2012.

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

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Foreword

This document (EN 1365-1:2012) 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of an identical text or by endorsement, at the latest by April 2013, and conflicting national standards shall be withdrawn at the latest by April 2013.

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 EN 1365-1:1999.

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

The main changes with respect to the previous edition are listed below:

- a) the introduction of mechanical loading into the test specimen;
- b) changes as a consequence of the modifications in EN 1363-1.

EN 1365, *Fire resistance tests for loadbearing elements*, consists of the following parts:

- *Part 1: Walls*; [SIST EN 1365-1:2013
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- *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 organisations 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.

EN 1365-1:2012 (E)**Introduction**

The purpose of this test is to measure the ability of a representative specimen of a loadbearing wall to resist the spread of fire from one side to another and to maintain its loadbearing capacity. It is applicable to internal and external walls.

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 operational 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 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.

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1 Scope

This European Standard specifies a method of testing the fire resistance of loadbearing walls. It is applicable to both internal and external walls. The fire resistance of external walls can be determined under internal or external exposure conditions.

The fire resistance performance of loadbearing walls is normally evaluated without perforations such as doors, glazing or fire resistant ducts. If it can be demonstrated that the design of the opening is such that load is not transmitted to the perforation, then the perforation need not be tested in the loaded condition. If perforations are to be included, the effects of these will need to be separately established.

This test method is not applicable to non-separating loadbearing walls which, in short widths, can be tested as columns to EN 1365-4.

This European Standard is used in conjunction with EN 1363-1:1999.

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

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

EN ISO 13943:2010, *Fire safety — Vocabulary (ISO 13943:2008)*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1363-1:1999 and EN ISO 13943:2010 together with the following apply.

3.1

loadbearing wall

wall designed to support an applied load

3.2

internal wall

wall which provides fire separation and which may be exposed separately to a fire from either side

3.3

external wall

wall forming the external envelope of a building which may be exposed separately to an internal or an external fire

3.4

insulated wall

wall, which satisfies both the integrity and insulation criteria for the anticipated fire resistance period

3.5

uninsulated wall

wall which satisfies the integrity and, where required, the radiation criteria for the anticipated fire resistance period, but which is not intended to provide insulation

Note 1 to entry: Such a loadbearing wall may consist entirely of uninsulated fire resistant panels

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3.6 plinth
form of construction that reduces the height of the opening by raising the support base to accommodate the test specimen

3.7 separating wall
wall provided within a building or between adjoining buildings to prevent the transfer of fire from one side to the other

4 Test equipment

4.1 General

In addition to the test equipment specified in EN 1363-1:1999, and if applicable EN 1363-2, the following is required.

4.2 Test frame

A test frame designed to accommodate the test specimen and apply the required test load. Examples of test frames which may be used for this purpose are shown in Figures 1 and 2.

4.3 Loading equipment

The load to the test specimen may be applied by means of loading jacks located either at the top or the bottom of the frame.

Where the loading is applied by a rigid beam, it shall be of sufficient stiffness to ensure uniform vertical deflection along the test specimen. Where the load is applied individually to studs within the wall the loading system shall allow for maintenance of constant load at each loading point.

5 Test conditions

5.1 Furnace atmosphere

The heating and pressure conditions and the furnace atmosphere shall conform to those given in EN 1363-1:1999.

5.2 Loading and restraint

The load and restraint shall conform to the requirements given in EN 1363-1:1999.

6 Test specimen

6.1 Size

If, in practice, the height or width of the construction is 3 m or smaller, then that dimension of the test specimen shall be tested at full size. If any dimension of the construction is greater than 3 m, then that dimension shall be tested at not less than 3 m.

6.2 Number

The number of test specimens shall be as given in EN 1363-1:1999. However, where information is required under different exposure conditions additional tests shall be undertaken for each situation using separate test specimens.

6.3 Design

The test specimen shall be fully representative of the construction intended for use in practice.

The test specimen should be designed to obtain the widest applicability of the test result when considered in conjunction with the direct and extended field of application rules. Some design features which influence fire performance that should be included can be derived from the field of direct application, see Clause 13.

The test specimen shall only contain a mixture of different designs providing this is representative of end use applications.

Where the test specimen can incorporate at least two full width boards, a full size board shall be adjacent to an edge. When it is not possible to incorporate two full size boards into the test specimen, the single full size board shall be located in the centre of the specimen, with smaller boards of equal width on each side. The smaller boards shall not be less than 500 mm wide. Where the smaller boards would be less than 500 mm wide, only one shall be used (see Figure 3).

If the element incorporates horizontal joints in practice, then the test specimen shall incorporate a horizontal joint. This joint shall be located between 350 mm and 650 mm in from the top edge and shall be on the outer layer on the unexposed face.

6.4 Construction

The test specimen shall be constructed as described in EN 1363-1:1999.

6.5 Verification

Verification of the test specimen shall be carried out as described in EN 1363-1:1999.

7 Installation of test specimen

7.1 General

The test construction shall be mounted in such a way that the whole of its exposed face (including edge conditions) shall be exposed to the heating conditions.

7.2 Supporting construction

If the size of the test specimen is smaller than the opening in the test frame then it shall be installed in the test frame using one of the following approaches:

- a) Where the height of the test specimen is smaller than the height of the test frame opening, a plinth shall be provided to reduce the opening to the required height.
- b) Where the width of the test specimen is less than the opening in the test frame, the opening may be reduced with a suitable construction attached to the inside vertical faces of the test frame, but with a clearance of between 25 mm to 50 mm from the vertical edges of the test specimen.

In either case above the use of a suitable construction shall not influence the overall performance of the test specimen.

EN 1365-1:2012 (E)**7.3 Loading and restraint of the test specimen**

A gap of 25 mm to 50 mm shall exist between the vertical edges of the test specimen and the test frame and/or any suitable construction used a furnace closure so that both vertical edges have freedom of movement. This gap shall be packed with a resilient non-combustible material, e.g. mineral fibre, to provide a seal without restricting freedom of movement.

The loading shall be applied to the test specimen either axially or eccentrically. The specimen shall be tested as foreseen in the intended use, i.e. both ends fixed or with only one horizontal edge hinged, using the components illustrated in Figures 1 and 2.

In order to avoid point loading, the interface between the specimen and the steel plate shall be made with an infill medium of suitable compressive strength and suitable fire resistance and a maximum thickness of 30 mm, unless the end-use application requires an alternative specification.

8 Conditioning

The test construction shall be conditioned in accordance with EN 1363-1:1999.

9 Application of instrumentation**9.1 Thermocouples****9.1.1 Furnace thermocouples (plate thermometers)**

Plate thermometers shall be provided in accordance with EN 1363-1:1999. There shall be at least one for every 1,5 m² of the exposed surface area of the test construction. The plate thermometers shall be oriented so that side 'A' faces the back wall of the furnace.

9.1.2 Unexposed face thermocouples**9.1.2.1 General**

For uninsulated loadbearing walls, the temperature of the unexposed face is not required to be measured and no thermocouples are therefore required to be attached.

For walls with an anticipated insulation performance in excess of 5 min, thermocouples of the type specified in EN 1363-1:1999 shall be attached to the unexposed face for the purpose of obtaining the average and the maximum surface temperatures. Examples of location of unexposed face thermocouples are given in Figures 4 to 13.

General rules for the attachment and exclusion of thermocouples given in EN 1363-1:1999 shall apply.

9.1.2.2 Average temperature**a) Uniform walls**

For test specimens which are uniform with respect to their expected thermal insulation, the average temperature of the unexposed face shall be measured by means of five thermocouples, one located close to the centre of the specimen and one close to the centre of each quarter section. Some typical examples are shown in Figures 4 to 13.

b) Non-uniform walls

For test specimens of non-uniform walls, i.e. those which contain discrete areas $\geq 0,1 \text{ m}^2$ expected to exhibit different levels of insulation performance, each discrete area shall be individually monitored for average

temperature rise. The average temperature rise shall be measured by thermocouples distributed over each discrete area. One thermocouple shall be provided for every 1,5 m² or part thereof of the specimen. A minimum of two thermocouples for each discrete area shall be provided.

9.1.2.3 Maximum temperature rise

For determination of maximum temperature, thermocouples shall be applied to the unexposed face as follows:

- a) at the head of the specimen at mid-width;
- b) at the head of the specimen in line with a stud/mullion;
- c) at the junction of a stud and a rail in a partition system;
- d) at mid height of one edge, 150 mm in from the edge;
- e) at mid width, where possible, adjacent to a horizontal joint (positive pressure zone);
- f) at mid height, where possible, adjacent to a vertical joint (positive pressure zone).

Thermocouples shall not be positioned closer than 100 mm from any discrete area that is not being evaluated for insulation.

9.2 Pressure

Pressure measuring devices shall be located in accordance with EN 1363-1:1999.

9.3 Deflection

9.3.1 Vertical

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Appropriate instrumentation shall be provided for measuring vertical deflection in accordance with EN 1363-1:1999. At least two measurements shall be made, one at each vertical side of the test specimen. (see Figures 1 and 2).

9.3.2 Horizontal

Appropriate instrumentation shall be provided to determine a history of all significant deflections (i.e. greater than 5 mm) of the test specimen during the test.

Measurements shall be made at the centre of the specimen and at mid height of a vertical edge, 50 mm in from the edge.

Guidance on the application of deflection measurements is given in EN 1363-1:1999.

NOTE Measurement of horizontal deflection is a mandatory requirement although there are no performance criteria associated with it. The horizontal deflection of the test specimen may be important in determining the extended field of application of the test result.

9.4 Radiation

If radiation is to be measured, radiometers shall be positioned as described in EN 1363-2.

9.5 Impact

If performance under the impact test is required, this shall be carried out as described in EN 1363-2.