SLOVENSKI STANDARD
oSIST prEN 1364-1:2012

01-januar-2012

Preskusi požarne odpornosti nenosilnih elementov - 1. del: Stene

Fire resistance tests for non-loadbearing elements - Part 1: Walls

Feuerwiderstandsprüfungen für nichttragende Bauteile - Teil 1: Wände

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

Ta slovenski standard je istoveten z: **prEN 1364-1 rev**

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

oSIST prEN 1364-1:2012 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 1364-1 rev

October 2011

ICS 13.220.50; 91.060.10

Will supersede EN 1364-1:1999

English Version

Fire resistance tests for non-loadbearing elements - Part 1: Walls

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Ref. No. prEN 1364-1 rev:2011: E

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Foreword

This document (prEN 1364-1:2011) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1364-1:1999.

EN 1364 ‘Fire resistance tests for non-loadbearing elements’ consists of the following

Part 1: Walls

Part 2: Ceilings

Part 3: Curtain walls - full configuration

Part 4: Curtain walls - part configuration

Introduction

The purpose of this test is to measure the ability of a representative specimen of a non-loadbearing wall to resist the spread of fire from one side to another.

It is applicable to non-loadbearing walls, with and without glazing, non-loadbearing walls consisting almost wholly of glazing and other non-loadbearing internal and external non-loadbearing walls.

It is not applicable to curtain walls (external non-loadbearing walls suspended in front of the floor slab) which are dealt with specifically in EN 1364-3.

For external fire exposure to a non-loadbearing external wall, the external fire exposure curve given in EN 1363-2 is used.

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 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.

1 Scope

This Part of EN 1364 specifies a method for determining the fire resistance of non-loadbearing walls.

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

It is applicable to internal non-loadbearing walls with and without glazing, non-loadbearing walls consisting almost wholly of glazing, (glazed non-loadbearing walls) and other non-loadbearing internal and external non-loadbearing walls with and without glazing.

The fire resistance of external non-loadbearing walls can be determined under internal or external exposure conditions. In the latter case the external fire exposure curve given in EN 1363-2 is used.

It is not applicable to:

i) curtain walls (external non-loadbearing walls suspended in front of the floor slab), unless explicitly permitted under EN 1364-3 which shall contain details of the methodology to be used.

ii) non-loadbearing walls containing door assemblies which shall be tested to EN 1634-1.

Specific requirements relating to the testing of glazing are given in annex A.

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 Fire resistance tests - Part 1: General requirements

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

EN 1364-3 Fire resistance tests for non-loadbearing elements - Part 3: Curtain walls - full configuration

EN 1634-1 Fire resistance tests for door and shutter assemblies - Part 1: Fire doors and shutters

EN ISO 13943 Fire safety - Vocabulary (ISO/DIS 13943:2008)

3 Definitions

For the purposes of this Part of EN 1364, the definitions given in EN 1363-1 and EN ISO 13943, together with the following, apply:

3.1 non-loadbearing wall

A wall designed not to be subject to any load other than its self-weight.

3.2 internal non-loadbearing wall

A wall, with or without glazing, which provides fire separation. It may be exposed separately to a fire from either side.

3.3 external non-loadbearing wall

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

3.4 insulated non-loadbearing wall

A wall, with or without glazing, which satisfies both the integrity and insulation criteria for the anticipated fire resistance period.

3.5 uninsulated non-loadbearing wall

A 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. Such a non-loadbearing wall may consist entirely of uninsulated fire resistant glazing.

3.6 fire resistant glazing

A glazing system consisting of one or more transparent or translucent panes with a suitable method of mounting, with e.g frames, seals, fixing materials etc, capable of satisfying the appropriate fire resistance criteria.

3.7 insulated glazing

Fire resistant glazing which satisfies both the integrity and insulation criteria for the anticipated fire resistance period.

3.8 uninsulated glazing

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

3.9 glazed elements

Building elements with one or more (light transmissive) panes, that are built in a frame with fixings and seals.

3.10 pane

A single piece of monolithic or laminated glass, or an insulated glass unit (IGU).

3.11 glazing system

Glass and glazing materials used in the fire test to glaze the glass into its framing system, e.g. glazing strips, beads and bead fixings, setting blocks, gaskets, sealant (see Figure 16).

3.12 butt-joint(ed) glazing

A glazing configuration where adjoining panes are connected without the use of framing profiles at the glass to glass joint.

3.13 framing system

Frame profiles and fixings to the supporting structure (e.g. wall) (see Figure 16).

3.14 aspect ratio

The ratio of the height of a pane to its width.

3.15 mullion

A vertical framing member separating and supporting two adjacent panes of glass or panels.

3.16 transom

A horizontal framing member separating and supporting two adjacent panes of glass or panels.

3.17 standard supporting construction

A form of construction used to close off the furnace and to support the non-loadbearing wall being evaluated and which has known resistance to thermal distortion.

3.18 plinth

A form of standard supporting construction that reduces the height of the opening by raising the support base to accommodate the test specimen.

3.19 overrun time

Period of fire resistance in minutes beyond the intended classification period achieved in the test.

4 Test equipment

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

A test frame shall be provided, the rigidity of which shall be evaluated by applying an expansion force within the frame at mid-way between two opposite members of the frame, and measuring the increase in the internal dimensions at these positions. This evaluation shall be conducted in both directions of the frame and the increase of the internal dimension shall be measured.

The increase in the internal dimensions of the test frame shall not exceed 5 mm with an applied force of

25 kN. In case of testing with a free edge, this requirement does not apply for the horizontal dimension.

5 Test conditions

The heating and pressure conditions and the furnace atmosphere shall conform to those given in EN 1363-1 or if applicable, EN 1363-2.

6 Test specimen

6.1 Size

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

6.2 Number

The number of test specimens shall be as given in EN 1363-1. However, where information is required under different exposure conditions or where the construction is to be evaluated with and without glazing, additional tests shall be undertaken for each situation using separate test specimens.

6.3 Design

6.3.1 General

The test specimen shall be either:

a) fully representative of the construction intended for use in practice, including any surface finishes and fittings which are essential and may influence its behaviour in the test,

or,

b) be designed to obtain the widest applicability of the test result to other similar constructions.

The design features which influence fire performance that should be included to give the widest application can be derived from the field of direct application, clause 13.

Guidance on testing glazed elements or non-loadbearing walls incorporating glazing is given in annex A.

Guidance on testing non-loadbearing external and internal walls designed to span horizontally between two independently proven fire resisting vertical structural elements is given in annex B.

6.3.1.1 Vertical joints

The test specimen shall contain as many full width boards as possible. Where the test specimen can incorporate at least two full width boards, the free edge shall be adjacent to a full sized board on the exposed face. (see figure 1, case A) When it is not possible to incorporate two full sized boards into the test specimen, the single full sized 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. (see figure 1, case B) Where the smaller boards would be less than 500 mm wide, only one shall be used next to the free edge of the specimen. (see figure 1, case C).

Note: 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, clause 13.

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

If the element incorporates vertical joints in practice, then the test specimen shall incorporate a vertical joint. This joint shall be located between 350mm and 650mm in from the free edge and shall be on the outer layer of the unexposed face.(see figure 1, case D). If joints may not be staggered, figure 1, case A prevails.

6.3.1.2 Horizontal joints

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

Note: Test specimens can incorporate both horizontal and vertical joints in the same test. If large dimension boards e.g. 3m high are used in practice, then this will necessitate two tests for a 3m x 3m furnace: one test to evaluate the effect of joints and another to evaluate the full height board. An alternative is to use a 4m high (or more) furnace in which both the full height board together with the joints at the specified locations can be incorporated in one test.

6.3.2 Restraint

When, in practice the test specimen is not larger than the front opening of the furnace, then the edges of the test specimen shall be restrained as in practice. Where, in practice the width of the construction is larger than the front opening of the furnace, one vertical edge shall be left unrestrained and there shall be a gap of 25mm to 50mm between the free edge of the test specimen and the test frame. 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 remaining edges shall be restrained as in practice.

Any construction including any sealing of the free edge shall respect the following principles:

a) prevent as far as possible the leakage of hot gases from the furnace into the test specimen;

b) prevent as far as possible the leakage of gasses out of the test specimen;

c) have as minimal effect as possible on the deformations of the test specimen;

d) have as minimal effect as possible on the insulation rating of the test specimen.

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 in the test frame and, if used, the supporting construction, as in practice.

The whole area of the test construction shall be exposed to the heating conditions.

7.2 Standard 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, then a plinth shall be provided to reduce the opening to the required height. The plinth shall possess sufficient stability for the test specimen and shall be selected from one of the rigid standard supporting constructions in EN 1363-1.

b) Where the width of the test specimen is smaller, a standard supporting construction shall be provided on the vertical sides of the opening selected from either the rigid or flexible standard supporting constructions given in EN 1363-1.

7.3 Non-standard supporting construction

If the test specimen is mounted in a supporting construction not given in EN 1363-1, then the result will only be valid for non-loadbearing walls mounted in the construction as tested.

8 Conditioning

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

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. There shall be at least one for every 1,5 m^2 of the area of the plane parallel to 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 non-loadbearing walls, glazed or unglazed, 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, thermocouples of the type specified in EN 1363-1 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 2 to 15.

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

Unexposed surface thermocouples may be placed on the test specimen at any angle and do not need to be parallel to the plane of the unexposed face.

9.1.2.2 Average temperature

a) Uniform non-loadbearing 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 2, 4, 6 and 9.

b) Non-uniform non-loadbearing walls

For test specimens of non-uniform non-loadbearing walls, i.e. those which contain discrete areas ≥ 0.1 m^2 expected to exhibit different levels of insulation performance e.g. glazing, 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 m^2 or part thereof of the specimen. A minimum of two thermocouples for each discrete area shall be provided. A typical example is shown in figure 12.