
**Preskusi požarne odpornosti nenosilnih elementov - 4. del: Obešene fasade -
Delna fasada**

Fire resistance tests for non-loadbearing elements - Part 4: Curtain walling - Part
configuration

Feuerwiderstandsprüfungen für nichttragende Bauteile - Teil 4: Vorhangfassaden -
Teilausführung

Essais de résistance au feu des éléments non-porteurs - Partie 4: Façades rideaux -
Configuration partielle

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Ta slovenski standard je istoveten z: EN 1364-4:2007

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

SIST EN 1364-4:2007**en,fr,de**

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EUROPEAN STANDARD

EN 1364-4

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2007

ICS 13.220.50

English Version

Fire resistance tests for non-loadbearing elements - Part 4: Curtain walling - Part configuration

Essais de résistance au feu des éléments non-porteurs -
Partie 4: Façades rideaux - Configuration partielle

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Teil 4: Vorhangfassaden - Teilausführung

This European Standard was approved by CEN on 9 December 2006.

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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 Management Centre has the same status as the official versions.

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EN 1364-4:2007 (E)**Foreword**

This document (EN 1364-4:2007) 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of an identical text or by endorsement, at the latest by September 2007, and conflicting national standards shall be withdrawn at the latest by September 2007.

EN 1364 "*Fire resistance tests for non-loadbearing elements*" consists of the following:

- *Part 1: Walls,*
- *Part 2: Ceilings,*
- *Part 3: Curtain walling – Full configuration (complete assembly),*
- *Part 4: Curtain walling – Part configuration.*

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

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Introduction

WARNING

The attention of all persons concerned with managing and carrying out this fire resistance test 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 developed 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.

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EN 1364-4:2007 (E)**1 Scope**

This European Standard specifies a method for determining the fire resistance of parts of curtain walling incorporating non-fire-resistant infilling product, e.g. glazing. It examines the fire resistance to internal and external fire exposure of:

- spandrels, including downstand, upstand or the combinations thereof,
- the horizontal linear gap seal and
- the fixings used to attach the curtain walling to the floor element.

The test method includes an assessment regarding falling parts that are liable to cause personal injury.

This European Standard does not cover over-cladding systems and ventilated façade systems on external walls. It does not deal with the reaction to fire behaviour of curtain walling.

This standard can also be used to determine fire resistance of parts of curtain walling to increase the field of application when previously tested to EN 1364-3.

This standard is intended to be read in conjunction with EN 1363-1 and EN 1363-2.

NOTE Annex A gives informative guidance on the principles of testing parts of curtain walling and the test method.

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2 Normative references (standards.iteh.ai)

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

EN 1364-3:2006, *Fire resistance tests for non-loadbearing elements — Part 3: Curtain walling — Full configuration (complete assembly)*

EN 13501-2:2006, *Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN 13830:2003, *Curtain walling — Product standard*

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, EN 1364-3:2006, EN ISO 13943:2000 and the following apply.

3.1

curtain walling

usually consists of vertical and horizontal structural members, connected together and anchored to the supporting structure of the building and infilled, to form lightweight, space enclosing continuous skin, which provides, by itself or in conjunction with the building construction, all the normal functions of an external wall, but does not take on any of the load-bearing characteristics of the building [EN 13830:2003]

3.2

non-loadbearing wall

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

3.3

non-loadbearing external wall

wall designed to form the external envelope of a building; a curtain wall is a special case of a non-load-bearing external wall

3.4

fire-resistant glazing

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

3.5

fire-resistant insulated glazing

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

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3.6

fire-resistant non-insulated 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

3.7

pane

single piece of glass

3.8

mullion

vertical structural framing member of a curtain wall

3.9

transom

horizontal structural framing member of a curtain wall

3.10

spandrel area

area of a curtain wall between two horizontal zones, normally between glazing and concealing the edge of the floor slab

3.11

spandrel panel

panel within the spandrel area

EN 1364-4:2007 (E)**3.12****downstand**

special type of spandrel panel, hanging down from or located in front of the floor

NOTE see Figure A.2

3.13**upstand**

special type of spandrel panel, standing up from or located in front of the floor

NOTE see Figure A.2

3.14**over-cladding system**

weather protection system applied to an external wall, sometimes referred to as *rain screen*

3.15**external fire exposure curve**

alternative heating regime used to simulate the exposure of a wall to a fire from the outside

3.16**standard configuration**

arrangement of curtain wall components in a test specimen with standard features to enable the use of extended application rules of test data

NOTE see Annex A

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3.17**supporting floor**

representation of a floor, forming part of the test equipment, to allow the fixing of the test specimen of the curtain wall and the installation of the horizontal linear gap seal

NOTE see Annex B

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3.18**mechanical stability**

ability to resist a part of a curtain walling dropping from the specimen as a result of a fixing failure

NOTE This corresponds to the wording of Mandate 117 "falling parts".

4 Test equipment**4.1 General testing principles**

Table 1 defines which specific test configuration shall be used for each part of the curtain walling depending on the type of fire exposure.

The test equipment specified in EN 1363-1 and EN 1363-2 shall be used where applicable.

Table 1 — Test configurations and exposure conditions

Product / component of curtain wall	Type of curtain wall	Fire exposure – internal, external	Test configuration (see Annex B)
Combination upstand-downstand	Non-fire-resistant glazing	EN 1363-1	1
		EN 1363-2	2
	Fire-resistant glazing	EN 1363-1	3
		EN 1363-2	4
Downstand	Non-fire-resistant glazing	EN 1363-1	5
		EN 1363-2	6
	Fire-resistant glazing	EN 1363-1	7
		EN 1363-2	8
Upstand	Non-fire-resistant glazing	EN 1363-1	9
		EN 1363-2	10
	Fire-resistant glazing	EN 1363-1	11
		EN 1363-2	12
Horizontal linear gap seal	Non-fire-resistant glazing	EN 1363-1	1, 5, 9, 13
	Fire-resistant glazing	EN 1363-1	3, 7, 11, 14
Fixing	Non-fire-resistant glazing	EN 1363-1	15
	Fire-resistant glazing	EN 1363-1	16
NOTE For more information on the test configuration depending on the heating exposure and explanation, see Table A.1.			

4.2 Furnace configuration

For the installation of the specimen, wall or floor furnaces shall be modified, if necessary, to accommodate the three-dimensional construction. The three dimensional construction includes the horizontal linear gap seal.

The test according to EN 1364-4 is performed on a three-dimensional specimen to allow an exposure of a number of surfaces of the upstand/downstand (spandrel area) and incorporates a standard floor, which provides the support for the curtain wall.

The lining of the furnace closure shall comply with EN 1363-1 or may consist of aerated autoclaved concrete with a density of 400 to 550 kg/m³.

4.3 Supporting floor

A supporting floor is provided as a base for the attachment of the fixings and as a location for the horizontal linear gap seal under examination. If information on the fire resistance of the curtain walling in conjunction with a particular type of floor construction is required, such a construction shall be used, see 7.2.

EN 1364-4:2007 (E)**5 Test conditions**

The heating and pressure conditions and the furnace atmosphere shall conform to those given in EN 1363-1 and, where applicable, EN 1363-2 for the external fire exposure curve.

Definitions of surfaces S1, S2, S3 and S5 are given in 6.4 and Figure 1.

The specimen shall be tested by controlling the heating conditions either on surface S1 or S2/S5 according to the test configuration selected from Table 1.

NOTE For further information see Annex A.

6 Test specimen**6.1 General**

The test specimen shall consist of parts of the curtain walling. It shall fully represent the construction on which information is required. For extension of results, one of the standard configurations given in Annex B should be used, see Clause 13. The test specimen shall consist of:

- the curtain walling system,
- the horizontal linear gap seal and
- the fixings to the supporting floor.

The fixing to the supporting floor shall be fully representative to that used in practice.

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6.2 Number of specimens

The performance of the curtain walling for internal and external exposure may be determined from a single test providing the specimen is heated to the internal exposure as controlled by T1 and the measured temperature from the furnace thermocouples T2 are greater than the external temperature specified in EN 1363-2. If this is not the case a separate test for external fire exposure is required.

If in practice the mullions are not fixed at each floor, the unrestrained condition shall be simulated.

6.3 Size of specimens

The size of the test specimen shall be as follows:

- a) the height of the spandrel area as in practice (normally 1 m),
- b) if the width of the part of curtain walling in practice is less than 3 m, the test specimen shall be full size as in practice,
- c) if the width of the part of the curtain walling is larger than 3 m, the width of the test specimen shall be not less than 3 m.

NOTE The height depends on national requirements.

If the height of the specimen is smaller than the vertical opening of the furnace, the furnace opening shall be closed with masonry constructed of Aerated Autoclaved Concrete (AAC) units with a density of 400 to 550 kg/m³.

Where the size of the curtain walling has been modified for the purpose of producing a specimen for the test, any cut surfaces shall be protected so as to prevent any additional heat transfer into the specimen, as compared with normal usage.

6.4 Surfaces

For definitions of the surface for the installation of the thermocouples depending on the fire exposure (internal or external) see Figure 1. The numbering of the surfaces is the same as that used in EN 1364-3.

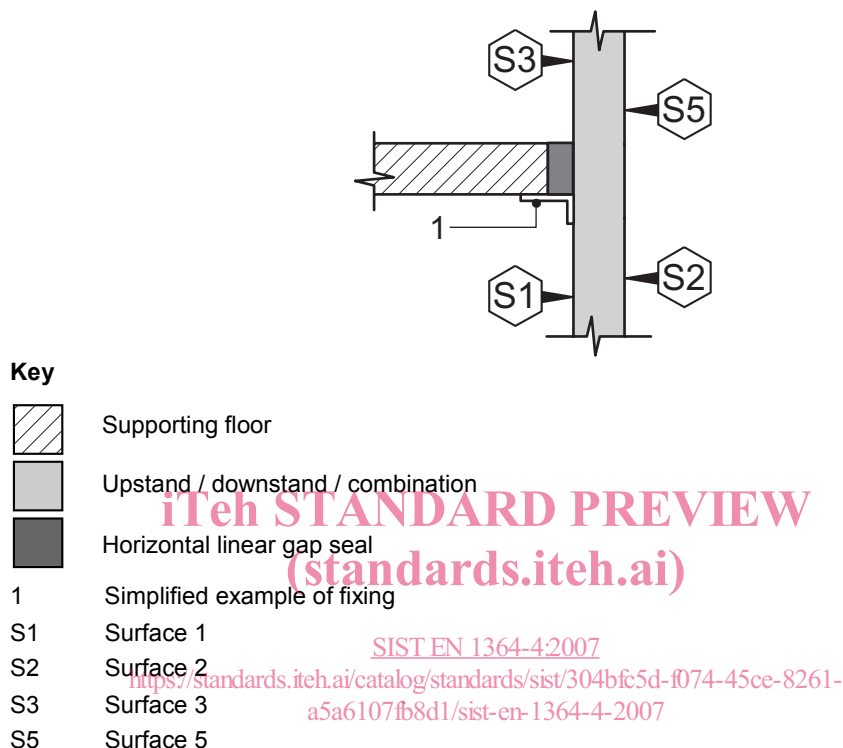


Figure 1 — Definition of surfaces

6.5 Design

6.5.1 General

The test specimen shall be:

- either fully representative of the construction intended for use in practice, including fixings, expansion joints, horizontal linear gap seals, any surface finishes and fittings which are essential and may influence its behaviour in the test,
- or be designed to obtain the widest applicability of the test result to other similar constructions. For standard configurations see Annex B.

All design features which influence fire performance shall be included.

Where the width of a single spandrel panel (upstand/downstand) is less than 3 m, at least 3 panels with the mid panel at the maximum dimension shall be incorporated in the test specimen. Where the width of the panel is greater than or equal to 3 m, at least 3 panels with the mid panel at the maximum dimension and the side panels at least 50 cm wide shall be incorporated in the test specimen.