SLOVENSKI STANDARD
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Preskusi požarne odpornosti nenosilnih elementov - 3. del: Obešene fasade - Celotna fasada

Fire resistance tests for non-loadbearing elements - Part 3: Curtain walling - Full configuration (complete assembly)

Feuerwiderstandsprüfungen für nichttragende Bauteile - Teil 3: Vorhangfassaden - Gesamtausführung

Essais de résistance au feu des éléments non-porteurs dans les bâtiments - Partie 3: Murs rideaux

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English Version

Fire resistance tests for non-loadbearing elements - Part 3: Curtain walling - Full configuration (complete assembly)

Essais de résistance au feu des éléments non-porteurs dans les bâtiments - Partie 3: Murs rideaux - Configuration en grandeur réelle (assemblage complet)

Feuerwiderstandsprüfungen für nichttragende Bauteile - Teil 3: Vorhangfassaden - Gesamtausführung

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Foreword

This document (EN 1364-3:2014) 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of an identical text or by endorsement, at the latest by July 2014, and conflicting national standards shall be withdrawn at the latest by July 2014.

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 1364-3:2006.

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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 operational hazards may also arise during the construction of the test elements or structures, during their testing and during the 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 European Standard specifies a method for determining the fire resistance of curtain walling – full configuration.

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

NOTE Annex B gives further information on the test method.

The test method is applicable to curtain walling type B (for definition see 3.4). The test is not appropriate for testing curtain walling type A (for definition see 3.3).

The fire resistance of curtain walling may be determined under internal or external exposure conditions. In the latter case the external fire exposure curve given in EN 1363-2 may be used, subject to deviating national regulations.

Tests on individual parts of a curtain walling (e.g. perimeter seal, infill panel or fixing of the framing system (anchoring) used to attach the curtain walling to the floor element) or systems with fire resistance requirements only to the spandrel area may be performed using EN 1364-4. For vertical linear gap seals, this part of the standard applies.

This European Standard does not cover double skin façades, 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 is intended to be read in conjunction with EN 1363-1 and EN 1363-2.

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, *Fire resistance tests - Part 1: General Requirements*

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

EN 13119, *Curtain walling - Terminology*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

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

EN 13830, *Curtain walling - Product standard*

EN ISO 13943, *Fire safety - Vocabulary (ISO 13943)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1363-1, EN 13119, EN 13830, EN ISO 13943 and the following apply.

3.1
anchoring
see *fixing of the framing system*

3.2
associated wall construction
form of construction required to close the vertical side of the furnace (not part of the test specimen)

3.3
curtain walling type A
curtain walling without fire resistant glazing outside the spandrel area – fire resistant only in the spandrel area

3.4
curtain walling type B
curtain walling with fire resistant glazing outside the spandrel area - fully fire resistant curtain walling

3.5
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

3.6
fire resistant translucent or transparent infill panel
glass product, monolithic, laminated or insulating glass unit, manufactured by a particular manufacturer and intended to be used as infill panel in curtain walling, which is CE marked based on a classification according to EN 13501-2 in minimum one glazed construction

Note 1 to entry: The term "insulating" when used with "insulating glass unit" according to EN 1279–1, should not be confused with the term "insulation" used in classification standard EN 13501–2.

3.7
fixing of the framing system
system used to attach the curtain wall to the loadbearing floor. It contains the brackets but not the anchor or other devices used to fix the brackets to the floor

3.8
glazing materials
all materials used to glaze the fire resistant translucent or transparent infill panel into its frame

3.9
horizontally faceted curtain walling
curtain walling with an angle between horizontally adjacent infill panels at the common mullion (see Figure 1)

3.10
insulating glass unit (IGU)
glass product according to EN 1279–1

3.11
perimeter seal
see EN 13119

3.12
over-cladding system
protection system fixed to an external wall for weather protection

3.13
overrun time
time of fire resistance in minutes beyond the envisaged classification time, achieved in the test

3.14
simulated wall construction
wall construction, necessary as part of the test specimen in case a vertical linear gap seal between a curtain walling and an abutting wall is to be tested

Note 1 to entry: The type of wall construction will determine the field of application for the vertical linear gap seal.

3.15
span length
distance between two sequent fixing points of the framing system along the direction of a mullion

3.16
vertical linear gap seal
seal of the vertical gap between the backside of the mullion of the curtain walling and the adjacent fire resistant separating wall

4 Test equipment

See EN 1363-1, and if applicable EN 1363-2.

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 which are related to the external fire curve.

6 Test specimen

6.1 Size

6.1.1 General

The exposed width and height shall not be less than 3 m.

There shall be a clearance of minimum 50 mm between the bottom edge of the test specimen and anything below that could give support to the test specimen (see Figures 2 and 3).

6.1.2 Internal fire exposure

The test specimen (see Figure 2) shall be of sufficient height to allow:

a) the inclusion of a spandrel area in front of the upper supporting floor as in practice. The spandrel may be cut in height so that it extends minimum 500 mm beyond the top of the upper supporting floor, if applicable.

b) the test specimen to extend 150 mm below the upper surface of the lower supporting floor with the bottom edge unsupported.

If an assessment of a vertical linear gap is required, the test specimen shall then be of sufficient width to allow a minimum of 500 mm of the test specimen to extend beyond the outside of the simulated wall.

6.1.3 External fire exposure

The test specimen shall be of sufficient height to allow the test specimen to extend minimum 150 mm below the upper surface of the lower supporting floor with the bottom edge unsupported in case the specimen is installed in front of the furnace (see Figure 3).

6.2 Number of specimens

Separate tests are necessary for internal and external exposure conditions.

Depending on the construction of the curtain walling and the intended field of application additional tests with faceted specimens may be necessary.

6.3 Design

6.3.1 General

The test specimen for internal exposure shall include the curtain walling, the perimeter seal and, if required, the vertical linear gap seal.

The test specimen for external exposure only includes the curtain walling. The supporting floors, the perimeter seal and the vertical linear gap seal may be omitted.

The test specimen or test construction, if appropriate, shall be:

a) either fully representative of the construction intended for use in practice, including fixing of the framing system, expansion joints, perimeter seals, vertical linear gap seals, any surface finishes and fittings which are essential and may influence its behaviour in the test, or

b) a standard configuration as defined in 6.3.2.

6.3.2 Standard configuration

A straight test specimen shall comprise a section of the curtain walling comprising minimum two mullions and two transoms or two vertical joints between panels in case of systems without a frame or mullions, fully exposed to the fire, see Figure 4. One of the mullions and transoms may be interrupted to allow the inclusion of T-connections. Figure 5 shows an example for the standard configuration of a test specimen including a vertical linear gap seal. Figure 6 shows an example for the standard configuration of a specimen including horizontal and vertical T-connections. Figure 7 shows details of the connection geometry between mullions and associated wall and simulated wall / vertical linear gap seal.

A faceted specimen shall comprise minimum four sections of the curtain walling forming minimum one corner of 90 degrees and two angles of 135 degrees, all sections with a minimum width of 500 mm, minimum three sections with a width of minimum 1000 mm, see Figures 8A to 8D. Two such specimens may be combined to a specimen forming two corners of 90 degrees and two angles of 135 degrees, see Figures 8E and 8F for examples. The sequence of the segments of the combined specimens may be different to that shown in Figure 8E and 8F except that the 500 mm wide section shall always be on one end.

In case a transom is located in front of the floor slab in practice the test specimen shall also contain a transom in front of the supporting floor. Such a transom is not considered being part of the perimeter seal but part of the framing.

6.3.3 Restraint

6.3.3.1 Internal exposure

The test specimen for internal exposure shall be fixed to the top and bottom supporting floor with the type of fixing of the framing system used in practice. The test specimen for external exposure shall be either fixed to a frame or fixed to the top or the bottom of the furnace as shown in Figure 9.

Both vertical edges shall be unrestrained. A suitable furnace closure at the free edge between the associated wall construction and the mullions shall be used that allows unrestrained movement of the mullions (see Figure 7 for options).

Maximum movement of the mullion is achieved when option A for detail D1 in Figure 7 is used.

6.3.3.2 External exposure

The vertical edges of the test specimen shall be unrestrained. If a construction as shown in Figure 9A is used for both vertical edges option A according to Figure 7 shall be used.

6.3.4 Surfaces

For definition of the surfaces for the installation of the thermocouples see Figure 2 for internal exposure and Figure 3 for external exposure.

NOTE Surface S2 is the external surface of the curtain walling.

6.3.5 Perimeter seal

In case mineral wool is used as backfilling material variations of the mineral wool may be used within one test specimen provided the length of the seal with a particular backfilling material is minimum the same as the distance between two mullions and it is located such that the splice between different backfilling materials is not located in the area of the mullion.

6.4 Construction

The test specimen shall be constructed as described in EN 1363-1, subject to deviating rules given in this standard.

In case a component of the curtain walling is cut all open gaps at the top end of the curtain walling shall be closed using material of class A1 according to EN 13501-1.

6.5 Verification

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

7 Installation of the test specimen

7.1 General

For internal exposure the test construction shall include the test specimen and in addition two supporting floors and two associated walls. In case a vertical linear gap seal is included in the test specimen a simulated wall is used instead of one associated wall. The test specimen shall be fitted to the supporting floors by means of the fixing of the framing system that is used in practice, see 7.2.

For external exposure a supporting frame which supports the specimen and is designed to allow the specimen to be supported and located adjacent to the furnace in case an installation in front of the furnace is used. For standard configurations see Figure 9.

In case a test specimen according to Figures 9B or 9C is intended to be used it shall comply with the following:

a) the test specimen shall be rigidly fixed only on top (hanging curtain walling) or at bottom (standing curtain walling);

b) the fixing on the opposite side as well as the adjacent furnace closure shall allow thermal extension of the specimen as in practice;

NOTE A gap of 50 to 100 mm is considered sufficient to allow thermal extension as in practice.

7.2 Supporting floors

7.2.1 Standard supporting floor

The standard supporting floor shall have a minimum thickness of 150 mm and minimum width of 500 mm for straight specimens. For faceted specimens the minimum width shall be 200 mm (see Figure 13). The floor shall be made of reinforced concrete or made of reinforced aerated concrete and shall be restrained at three sides.

7.2.2 Non-standard supporting floor

Any floor construction as in practise may be used. The results of the test are limited to that floor construction only (no field of direct application concerning floor constructions).

7.3 Simulated wall construction

7.3.1 Standard construction

The construction details of standard wall constructions shall be in accordance with EN 1363-1. The method of sealing the vertical linear gap between the test specimen and the simulated wall construction shall be recorded in the test report.

7.3.2 Non-standard construction

Any wall construction as in practise may be used. The result of the test is limited to that construction only (no field of direct application).

7.4 Furnace closure

The furnace closure shall be done with a mineral wool packing of class A1 according to EN 13501-1 to allow the specimen to move to a similar extent as in practice.

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 exposed surface area of the test construction. The plate thermometers shall be oriented so that side ‘A’ faces the back wall of the furnace. In case of faceted specimens the plate thermometers shall be located in a way that allows a good control of the temperature distribution inside the furnace. If the specimen shades the plate thermometer the maximum distance from the plate thermometer to the specimen may be increased to (250 ± 50) mm. For details of location of plate thermometers in case of faceted specimens see Figure 10.

9.1.2 Unexposed face thermocouples

9.1.2.1 General

The general rules for the attachment and exclusion of unexposed face thermocouples given in EN 1363-1 shall apply.

9.1.2.2 Mean temperature rise

The mean temperature rise shall be measured on each discrete infill / panel area ≥ 0,1 m^2 by means of one thermocouple per 1,5 m^2, subject to minimum two thermocouples per discrete area. The mean temperature rise shall only be measured in the upper spandrel area and the non-spandrel area (e.g. vision glass area). The thermocouples shall be located in two opposite corners at a distance of approximately a third of the width and approximately a third of the length of the discrete area, see Figure 11. If due to the size of the discrete area a third thermocouple is required it shall be positioned close to the centre of the discrete area. In case more thermocouples are required, one shall be located close to the centre of the infill / panel and the others close to the centre of each quarter section. Records from all discrete areas of the same type shall be used for calculating the mean temperature rise. Thermocouples shall not be positioned closer than 100 mm from any discrete area that is not being evaluated for insulation.

For test specimens which are non-uniform, i.e. those which have surface corrugations or ribs, the temperature of each area/surface type shall be monitored to determine the mean temperature rise.

As there are no evaluation criteria for the perimeter seal, the mean temperature rise is not measured.

9.1.2.3 Maximum temperature rise

9.1.2.3.1 General

Thermocouples for the determination of maximum temperature rise may need to be added or their location be changed for particular constructions other than the ones shown in Figures 4 to 6 (straight specimen) and 12 to 14 (faceted specimen). Clauses 9.1.2.3.2 to 9.1.2.3.6 for the location of thermocouples for determination of maximum temperature rise are obligatory for standard configurations and are given as guidance for non-standard configurations.

The mean temperature rise thermocouples shall also be used to evaluate the maximum temperature rise.