
Preskusi požarne odpornosti vrat in drugih zapornih elementov - 1. del: Požarna vrata in zapore

Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 1: Fire resistance test for doors and shutter assemblies and openable windows

Prüfungen zum Feuerwiderstand und zur Rauchdichte für Feuer- und Rauchschutzabschlüsse, Fenster und Beschläge – Teil 1: Prüfungen zum Feuerwiderstand für Feuerschutzabschlüsse und Fenster

Essais de résistance au feu et d'étanchéité aux fumées des portes, fermetures, fenêtrés et éléments de quincailleries – Partie 1: Essais de résistance au feu des portes, fermetures et fenêtrés

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91.060.50	Vrata in okna	Doors and windows
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English version

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

Essais de résistance au feu des blocs-portes et blocs-fermetures - Partie 1: Portes et fermetures résistantes au feu

Feuerwiderstandsprüfungen für Tür- und Abschlusseinrichtungen - Teil 1: Feuerschutzabschlüsse

This European Standard was approved by CEN on 18 February 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 European Standard 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of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by October 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement the European Standard; Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This European 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 1634 'Fire resistance tests for door and shutter assemblies' consists of the following

Part 1: Fire doors and shutters

Part 2: Fire door hardware (in course of preparation)

Part 3: Smoke control doors (in course of preparation)

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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, 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.

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1 Scope

This Part of EN 1634 specifies a method for determining the fire resistance of door and shutter assemblies designed for installation within openings incorporated in vertical separating elements, such as:

- hinged and pivoted doors
- horizontally sliding and vertically sliding doors including articulated sliding doors, sectional doors
- steel single skin folding shutters (uninsulated)
- other sliding folding doors
- tilting doors
- rolling shutter doors

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

Doors tested in accordance with this Standard can be acceptable for certain lift landing door applications.

The testing of fire dampers and closures for conveyors and track bound transportation systems are specifically excluded.

No requirements are included for mechanical conditioning e.g. 'shakedown' or durability as these are included in the relevant product standard.

This method may also be used to determine the fire resistance of non-loadbearing horizontal doors by analogy. However, these are not specifically addressed here and the field of direct application given in clause 13 is not valid for horizontally oriented doors.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1363-1 Fire resistance tests - Part 1: General requirements

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

prEN ISO 13943 Fire safety - Vocabulary (ISO/DIS 13943)

3 Definitions

For the purposes of this Part of EN 1634, the definitions given in EN 1363-1 and ISO/DIS 13943, together with the following, apply:

3.1 door or shutter assembly (doorset): The complete assembly, including any frame or guide, door leaf or leaves, rolling or folding curtain, etc., which is provided for closing of permanent openings in separating elements. This includes all side-panels, vision panels or transom panels, together with the door hardware and any seals (whether provided for the purpose of fire or smoke control or for other purposes such as draught or acoustics) which are used in the assembly.

3.2 door hardware: Items such as hinges, handles, locks, panic bar(s), escutcheons, letter plates, kick plates, sliding gear, closing devices, electrical components, wiring, etc., which are, or can be, used in the door or shutter assembly.

3.3 single action: The action of a fire door leaf which only opens in one direction.

3.4 double action: The action of a fire door leaf which opens in both directions.

3.5 fire seal: A seal fitted to the leaf edge or frame reveal for the purpose of extending the period of integrity of the assembly.

3.6 smoke seal: A seal fitted to the leaf edge or frame reveal for the purpose of restricting the flow of smoke or hot gases.

3.7 floor: The upper surface of the horizontal element on which the door assembly is mounted and which extends from the exposed face to the unexposed face of the assembly.

3.8 cill: A member which connects two frame jambs together at the base which may or may not be set into the floor and remains visible.

3.9 gap: The clearance between two nominally adjacent surfaces and/or edges e.g. between the edge of leaf and the reveal of the frame or face of the leaf and the frame stop.

3.10 through connection: A fixing or internal spacer that either penetrates through the door or shutter construction from one face to another or directly connect the faces one to the other.

3.11 standard supporting construction: A form of construction used to close off the furnace and to support the door or shutter assembly being evaluated and which has a quantifiable influence on both the thermal heat transfer between the construction and the test specimen and provides known resistance to thermal distortion.

3.12 associated supporting construction: A specific construction in which the door or shutter assembly is to be installed in practice and which is used to close off the furnace and provide the levels of restraint and thermal heat transfer to be experienced in normal use.

3.13 test specimen: A door or shutter assembly which is to be installed in a standard or associated supporting construction to allow it to be evaluated.

3.14 transom: A member that extends across the frame from jamb to jamb at the head of the leaf and which creates an aperture to house a transom panel.

3.15 transom panel: A fixed panel which is incorporated above a door and is bounded on all edges by either the frame head, the jambs or the transom.

3.16 flush over panel: A fixed panel fitted within the head and jambs above the door leaf without a transom fitted and which is of a similar thickness and appearance to the door leaf.

3.17 side panel: A fixed panel which is incorporated to one side of a door which is part of the test specimen.

3.18 primary leaf: The leaf of a multi leaved door assembly that is the largest and/or has the handle attached to it as the preferred leaf for general operation. If the leaves of a multi leaved door are the same size and if the handles (or other hardware such as push plates) are fitted to all leaves, then no primary leaf exists for that door assembly.

4 Test equipment

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

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

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6.1 Size

The test specimen and all its components shall be full size unless limited by the size of the front opening of the furnace which will normally be 3 m x 3 m. Door assemblies which cannot be tested at full size shall normally be tested to the maximum size possible consistent with 7.2.3.

6.2 Number

The number of test specimens shall be selected as described in EN 1363-1. If testing is carried out from one side only, whether due to the fact that the door assembly is symmetrical or because it is only required to resist fire from one side this shall be stated in the test report.

6.3 Design

The design of the test specimen and the choice of supporting construction shall take into account the requirements of clause 13 if the widest field of direct application is to be achieved.

The sponsor shall declare to the laboratory the design gaps (see 3.9) including tolerances.

Where the door or shutter assembly incorporates side, transom or flush over panels, whether glazed or unglazed, these shall be tested as part of the door assembly. The side panel shall always be on the latch side.

The test specimen shall be fully representative of the door or shutter assembly intended for use in practice, including any appropriate surface finishes and fittings which are an essential part of the specimen and may influence its behaviour in test.

6.4 Construction

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

6.5 Verification

The sponsor shall provide a specification to a level of detail sufficient to allow the laboratory to conduct a detailed examination of the specimen before the test and to agree the accuracy of the information supplied. EN 1363-1 provides detailed guidance on verification of the test specimen.

When the method of construction precludes a detailed survey of the specimen, without having to permanently damage it or if it is considered that it will subsequently be impossible to evaluate construction details from a post test examination, then one of two options shall be exercised by the laboratory, either:

- a) the laboratory shall request to oversee the manufacture of the door or shutter assembly(ies) which is to be the subject of the test; or
- b) the sponsor shall, at the discretion of the laboratory, be requested to supply an additional assembly or that part of the assembly which cannot be verified (e.g. a door leaf) to the number required for test. The laboratory shall then choose freely which of these shall be submitted to the test and which shall be used to verify the construction.

7 Installation of test specimen

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7.1 General

The test specimen shall be installed, as far as possible, in a manner representative of its use in practice.

The specimen shall be mounted in a supporting construction which covers the type in which it is intended to be used. The design of the connection between the door or shutter assembly and the supporting construction, including any fixings and materials used to make the junction, shall be as used in practice and shall be regarded as part of the test specimen. The door and frame assembly shall be mounted within the supporting construction so that it is flush with the exposed face of the supporting construction, unless the normal mounting procedure provides does not allow this.

The whole area of the test specimen, together with at least the minimum dimensions of the supporting construction required by 7.2.3 shall be exposed to the heating conditions.

7.2 Supporting construction

7.2.1 General

The fire resistance of any supporting construction shall not be determined from a test in conjunction with a door or shutter assembly and shall be at least commensurate with that anticipated for the door or shutter assembly.

7.2.2 Standard supporting construction

The choice of standard supporting construction shall reflect the intended normal use of the door or shutter assembly. The rules governing the applicability of the chosen standard supporting construction to other end use situations are given in 13.5.

The standard supporting construction shall be chosen from those given in EN 1363-1.

7.2.3 Erection of standard supporting or associated supporting constructions

Figures 1 to 8 illustrate the use of supporting constructions in conjunction with the mounting of specimens of different types of door or shutter assemblies.

For flexible standard supporting constructions and all associated supporting constructions the partition or wall shall be erected so that it can distort freely perpendicular to the plane of the construction along the vertical edges, i.e. there shall be a free edge at each end of the construction.

For rigid standard supporting constructions the wall shall be erected with no freedom to distort perpendicular to the plane of the wall along the vertical edges, i.e. it shall be fixed to the inside of the test frame as in practice.

The supporting construction shall be built within a test frame conforming to clause 4 of EN 1363-1:1999. The supporting construction shall be prepared in advance of the fitting of the specimen leaving an aperture of the desired size, except when it is normally erected in conjunction with the door or shutter assembly using appropriate fixing methods. There shall be a minimum zone of supporting construction of 200 mm wide exposed within the furnace, each side and over the top of the aperture into which the door and frame assembly is to be fixed. The thickness of the supporting construction may be increased outside of the 200 mm zone. The test construction may incorporate more than one test specimen providing that there is minimum separation between each specimen and between the specimens and the edge of the furnace.

If the bottom of the door or shutter assembly is at floor level in practice, then at the bottom of the aperture continuity of the floor shall be simulated using a solid non-combustible rigid material which has a minimum width of 200 mm on each side of the assembly (i.e. from the exposed to the unexposed face). The furnace floor can be regarded as part of the simulation of the floor continuity provided that it is level with the base of the assembly. If a cill detail is incorporated as part of the door or shutter assembly this shall be incorporated within or placed on top of the extension. If the door or shutter assembly is not to be used at floor level, and provided that it has a frame detail to all four sides of the aperture, then it may be mounted simply within the thickness of the wall, without the extension.

NOTE. If the door assembly is tested in conjunction with a non-combustible floor then this may not represent the situation when the door is installed above a combustible flooring such as timber or carpet.

7.3 Gaps

The adjustment of the door leaf(ves) or shutter and gaps shall be within the tolerances of the design values stipulated by the sponsor. These shall be representative of those used in practice so that appropriate clearances exist, e.g. between the fixed and moveable components.

In order to generate the widest field of direct application, the gaps shall be set in between the middle value and the maximum value within the range of gaps given by the sponsor.

NOTE: A door assembly with a specified range of gaps from 3 mm to 8 mm is tested with gaps set between 5,5 mm and 8 mm.

Examples of gap measurements are given in figures 9 to 12.

8 Conditioning

8.1 Moisture content

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

Requirements for conditioning of supporting constructions are given in annex A.

8.2 Mechanical

Reference shall be made to the product standard for details of requirements for mechanical conditioning of the test specimen before fire testing e.g. operational test, 'shake down' or specimen self closing test.

Durability requirements are given in the relevant product standard.

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. They shall be evenly distributed over a vertical plane 100 mm from the nearest plane of the test construction (see figure 13). There shall be at least one plate thermometer for every 1,5 m² of the exposed surface area of the test construction, subject to a minimum of four.

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

Where no evaluation against the insulation criteria is required of the door or shutter assembly, or any part thereof, no temperature measurements are required.

Where compliance with the insulation criteria is required to be evaluated, thermocouples of the type specified in EN 1363-1 shall be attached to the unexposed face for the purpose of obtaining the average and maximum surface temperatures. General principles for the attachment and exclusion of thermocouples given in EN 1363-1 shall apply.

Evaluation of insulation against a supplementary procedure (see 9.1.2.4) is provided in addition to the normal requirement. The sponsor shall instruct the laboratory if he requires evaluation of the door or shutter assembly against the supplementary procedure as this requires the application of additional thermocouples for this purpose.

The temperature of the supporting construction in which the door assembly is mounted is not required to be measured and therefore no thermocouples are required to be attached to it.

No thermocouple shall be placed within 50 mm of any ironmongery.

Examples of the location of unexposed face thermocouples are shown in figures 14 to 27.

9.1.2.2 Average temperature

Position five thermocouples, (for single or double leaf doors) one at the centre of the leaf (leaves) and one at the centre of each quarter section. These shall not be located closer than 50 mm to any joint, stiffener or through component, nor closer than 100 mm to the edge of the leaf (leaves) or curtain.

For door or shutter assemblies which incorporate discrete areas of different thermal insulation $\geq 0,1 \text{ m}^2$ (e.g. flush over panels, transom panels, side panels, or glazed panels within a door leaf) extra thermocouples shall be evenly distributed over the sum of the surface of those areas to determine the average temperature at a density of one thermocouple per square metre or part thereof, subject to a minimum of two. The average insulation performance of the sum of each area shall be determined.

When the total area of a single portion of the door or shutter assembly represents less than $0,1 \text{ m}^2$ it shall be disregarded for the purpose of ascertaining the average unexposed face temperature.

9.1.2.3 Maximum temperature

a) General

The maximum temperature shall be determined from the five thermocouples fixed to determine the average temperature rise (as given in 9.1.2.2), the roving thermocouple and from additional thermocouples fixed as indicated in 9.1.2.3 b), 9.1.2.3 c) and 9.1.2.3 d).

If the door or shutter assembly incorporates discrete areas of different thermal insulation $\geq 0,1 \text{ m}^2$ (e.g. flush over panels, transom panels, side panels or glazed panels within a door area) which are evaluated separately with respect to average temperature rise, then the evaluation of maximum unexposed face temperature of those areas shall also be undertaken separately. This may require extra unexposed surface thermocouples to be applied as given in c) and d).

Thermocouples shall not be placed on fasteners with a surface diameter less than 12 mm unless they extend through the assembly.

b) Temperature of door frame

Thermocouples shall be fixed at each of the following positions:

- i) one at mid-height on each vertical member.
- ii) one on the horizontal top member of the frame (and any transom $>30\text{mm}$ wide, if fitted) at mid-width (100mm away from the door joint of a multileaf door on the primary leaf side).
- iii) on the horizontal top member of the frame (and any transom $>30 \text{ mm}$ wide, if fitted) 50mm in from each corner of the leaf opening.

At each of the positions, thermocouples shall be fixed as close as possible i.e. with the centre of the disc 15mm from the junction between the frame and the supporting construction. Irrespective of this, the distance of these thermocouples from the inside edge of the frame shall not be greater than 100 mm. See figure 16.

NOTE : For single leaf doors, if due to the narrow width of the opening the thermocouples specified in ii) and iii) are closer than 550 mm to each other, then that specified in ii) is omitted. See figure 21.

c) Temperature of door leaf or shutter

Thermocouples shall be fixed to the face of each leaf (leaves) or shutter (s) as follows:

- i) at mid-height, 100 mm in from the vertical edges as specified below
- ii) at mid-width, 100 mm down from the horizontal edge as specified below
- iii) 100 mm in from the vertical edges, 100 mm down from the horizontal edge as follows:
 - the inside edges of the clear opening for:
 - hinged or pivoted doors opening towards the furnace
 - shutters or sliding doors installed on the exposed side of the supporting construction
 - the visible part of the edge of the door leaf for:
 - hinged or pivoted doors opening away from the furnace
 - shutters or sliding doors installed on the unexposed side of the supporting construction

See figures 14 to 21 and 23 to 27.

NOTE 1: If due to the narrow width of the leaf (leaves) or shutter (s) the thermocouples specified in ii) and iii) are closer than 500 mm to each other, then those specified in ii) are omitted.

NOTE 2: If the leaf is < 200 mm wide (e.g. as in a multi-leaf folding shutter) then the leaves will be treated as if they were one leaf with respect to application of unexposed face thermocouples for evaluating maximum temperature rise.

Examples of the reduction in the requirement for unexposed face thermocouples with width are given in figure 21.

Additional thermocouples shall be fixed to other areas of the leaf or shutter, e.g. over any through connection or position where the temperature might be expected to be higher than the mean for the surface subject to the limitations given in 9.1.2.3 a). The additional thermocouples shall be placed not less than 100 mm from the edges of the door leaf.

d) Temperatures of other areas

Thermocouples for determination of the maximum temperature rise of side, transom and flush overpanels and discrete panels of different thermal insulation within the door leaf shall be applied as for door leaves. However, if there is more than one other area of the same type then they shall be treated as one large area (as those for the average temperature rise are). In such cases thermocouples shall avoid any framework adjacent to the frame leaf. See figure 26 and 27.

In addition, thermocouples shall be placed on flush overpanels and transom panels above door leaves (but not discrete panels within the leaf) as follows:

- i) at mid-width, 100 mm up from the horizontal edge
- ii) 100 mm in from the vertical edges, 100 mm up from the horizontal edges.

See figures 23 and 24 for examples of the above. See figure 22 for exclusion of thermocouples on panels on the basis of size and distance between thermocouples.

The rules for reducing the number of thermocouples on door leaves of decreasing width shall also apply to transom panels, side panels and flush over panels. See figure 21 for examples.

9.1.2.4 Maximum temperature (supplementary procedure)

a) General

The maximum temperature shall be determined from the thermocouples used for the determination of maximum temperature together with additional thermocouples fixed as indicated in 9.1.2.4 b) and 9.1.2.4 c).

b) Temperature of door leaf or shutter

Thermocouples shall be fixed to the face of each leaf (leaves) or shutter (s) as follows:

- i) at mid-height, 25 mm in from the vertical edges as specified below
- ii) at mid-width, 25 mm down from the horizontal edge as specified below
- iii) 25 mm in from the vertical edges, 25 mm down from the horizontal edge as follows

- the inside edges of the clear opening for:
 - hinged or pivoted doors opening towards the furnace
 - shutters or sliding doors installed on the exposed side of the supporting construction.
- the visible part of the edge of the door leaf
 - hinged or pivoted doors opening away from the furnace
 - shutters or sliding doors installed on the unexposed side of the supporting construction.

NOTE 1: If due to the narrow width of the leaf (leaves) or shutter (s) the thermocouples specified in ii) and iii) are closer than 575 mm to each other, then those specified in ii) are omitted.

NOTE 2: If the leaf is < 200 mm wide (e.g. as in a multi-leaf folding shutter) then the leaves will be treated as if they were one leaf with respect to application of unexposed face thermocouples for evaluating maximum temperature rise.

Examples of the variation in the requirement for unexposed face thermocouples with width are given in figure 21.