

SLOVENSKI STANDARD

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Preskusi požarne odpornosti vrat in drugih zapornih sestavov - 3. del: Dimna vrata in zapore

Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 3: Smoke control test for door and shutter assemblies

Prüfungen zum Feuerwiderstand und zur Rauchdichte für Feuer- und Rauchschutzabschlüsse, Fenster und Beschläge – Teil 3: Prüfungen zur Rauchdichte für Rauchschutzabschlüsse

Essais de résistance au feu et d'étanchéité aux fumées des portes, fermetures, fenêtrés et éléments de quincailleries – Partie 3: Essais d'étanchéité aux fumées des portes et fermetures

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ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
91.060.50	Vrata in okna	Doors and windows

SIST EN 1634-3:2005 **en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1634-3

October 2004

ICS 13.220.50

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English version

**Fire resistance tests for door and shutter assemblies - Part 3:
Smoke control doors and shutters**

Essais de résistance au feu des portes et fermetures -
Partie 3: Portes et volets pare-fumées

Feuerwiderstandsprüfungen für Tür- und
Abschlusseinrichtungen - Teil 3: Rauchschutzabschlüsse

This European Standard was approved by CEN on 15 July 2004.

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 document (EN 1634-3:2004) 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 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

This document has been prepared under mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the Construction Products Directive.

This document supersedes EN 1634-3:2001.

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 - Building hardware for fire resisting doorsets and openable windows (in course of preparation),*

Part 3: *Smoke control doors and shutters.*

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

Caution

The attention of all persons concerned with managing and carrying out this test is drawn to the following. Mechanical and operation hazards may 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.

EN 1634-3:2004 (E)**1 Scope**

This Part of EN 1634 specifies a method for determining the leakage of cold and warm smoke from one side of a door assembly to the other under the specified test conditions. The test can be applied to door and shutter assemblies of different types intended for purposes of controlling the passage of smoke in case of fire. This test can also be applied to lift landing doors and conveyor system doors and shutters. The principle of the test is explained briefly 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 1363-1:1999, *Fire resistance tests — Part 1: General requirements*

EN 1634-1:2000, *Fire resistance tests for door and shutter assemblies — Part 1: Fire doors and shutters*

EN 13501-2:2003, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

prEN 14600, *Fire resisting and/or smoke control doorsets and operable windows - Requirements and classification*

EN ISO 13943:2000, *Fire safety — Vocabulary (ISO 13943:2000)*

3 Definitions, symbols and designations**3.1 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 1363-1:1999, EN 1634-1:2000 and EN ISO 13943:2000, together with the following, apply:

3.1.1**smoke control door**

door assembly which has the function of restricting the passage of smoke, when in a closed position, to prescribed limits

3.1.2**ambient temperature**

for the purpose of this standard ambient temperature is an air temperature of $(20 \pm 10) ^\circ\text{C}$

3.1.3**medium temperature**

for the purpose of this standard medium temperature is an air temperature of $(200 \pm 20) ^\circ\text{C}$

3.1.4**smoke leakage Sa**

ambient temperature smoke leakage classification as defined in 7.5.6.3.1 of EN 13501-2:2003

3.1.5**smoke leakage S_m**

ambient plus medium temperature (200 °C) smoke leakage classification as defined in 7.5.6.3.1 of EN 13501-2:2003

3.1.6**test specimen**

door or shutter assembly on which leakage measurements are to be made. It includes all the components necessary for the use of the door when installed in a building e.g. side panels and over panels

3.1.7**associated construction**

specific form of construction in which the test specimen is mounted which is identical to that into which the door or shutter assembly is designed to be installed in practice. The method of sealing the joint between the test specimen and the associated construction is specific to that construction and forms part of the construction being evaluated by the test

3.1.8**supporting construction**

form of construction with adequate strength and stiffness which is used to support the test specimen and to fill up the difference between the size of the test specimen and the opening in the test frame in an impermeable manner. The seal between the test specimen and the supporting construction should be impermeable and withstand the test temperature and is part of the test. The test frame may be considered to be part of the supporting construction

3.1.9**test specimen leakage rate Q_{spec}**

leakage through the test specimen (3.1.6) and seal between that and the test frame or any supporting/associated construction used

3.1.10**test specimen linear leakage rate Q_l**

leakage rate through the test specimen (3.1.6) and seal between and the test frame or any supporting/associated construction used, excluding any leakage at the threshold, expressed in terms of loss per linear metre of the perimeter bounded by the door frame when excluding the length of the threshold

3.1.11**aspect ratio**

fixed relationship of width divided by height of a four sided constructional component

3.2 Symbols and designation

The symbols and designation listed below define those used in this standard.

Symbol	Unit	Designation
Q	m^3/h	leakage rate
Q_{app}	m^3/h	apparatus leakage rate
$Q_{sup/assoc}$	m^3/h	supporting/associated construction leakage rate
Q_{spec}	m^3/h	test specimen leakage rate
Q_t	m^3/h	total leakage rate
Q_l	$m^3/h/m$	linear leakage rate

4 Test equipment

4.1 Test apparatus

The test apparatus consists of a test chamber with an open front where the test construction is mounted to provide a sealed enclosure. The opening of the test frame shall be sufficient to accommodate the test specimen with its associated or supporting construction, in general an opening of $3\text{ m} \times 3\text{ m}$ is sufficient for most door types.

A fan system is used to create the pressure differential and, for testing to evaluate S_m , a heating system is used to generate the temperatures specified in clause 5. The fan and the heating system shall be able to replace air at ambient and medium temperature, as required, in order to compensate for leakage rates through the test assembly.

Annex B provides an outline specification for a suitable apparatus but other designs are possible to achieve the same objectives.

4.2 Instrumentation

4.2.1 Air temperature

All thermocouples for the measurement of air temperature shall be of bare metal type with a wire diameter of 0,5 mm or steel sheathed type with the overall diameter not exceeding 1,0 mm.

For ambient temperature only leakage evaluation test to satisfy S_a , the temperature measuring equipment shall be capable of measuring temperatures up to 50°C with an accuracy of $\pm 4^\circ\text{C}$.

For ambient together with medium temperature leakage evaluation test to satisfy S_m , the temperature measuring equipment shall be capable of measuring temperatures up to 250°C with an accuracy of $\pm 5^\circ\text{C}$.

4.2.2 Pressure

A suitable instrument shall be provided to measure the static pressure difference between the inside and outside of the test chamber. The pressure measuring equipment shall be capable of measuring pressures with an accuracy of 10 % of the measured value.

4.2.3 Air flow

Instrumentation shall be provided to measure the volume, Q_b , and the temperature of air supplied to or extracted from the apparatus to compensate for the total leakage. The apparatus shall be able to measure leakage up to at least $55\text{ m}^3/\text{h}$ to an accuracy of $1\text{ m}^3/\text{h}$.

5 Test conditions

A fan system shall be provided to create a pressure differential across the test specimen of at least 55 Pa.

When testing for ambient together with medium temperature leakage, s_m , provision shall be made to heat the circulating air to the test temperature of $(200 \pm 20) ^\circ\text{C}$ within the test duration and to control the temperature within the prescribed limits given in 10.2.2.2.

The test chamber shall be well sealed and the apparatus leakage rate together with the leakage rate through an associated/supporting construction ($Q_{\text{app}} + Q_{\text{sup/assoc}}$) shall not exceed $10 \text{ m}^3/\text{h}$ at 50 Pa and ambient temperature.

6 Test specimen

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 test apparatus, which will normally be $3 \text{ m} \times 3 \text{ m}$. Door assemblies which cannot be tested at full size shall be tested to the maximum size possible consistent with the use of supporting or associated constructions. If an associated construction is used, a minimum zone shall be exposed within the chamber, 200 mm wide each side and over the top of the aperture, into which the door assembly is to be fixed.

6.2 Number

Leakage tests shall be carried out from both sides for full evaluation except for doors for special applications. The number of tests shall be as given in Table 1.

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Table 1 — Number of tests

Application	Temperature	Number of tests
General	Ambient	One test for each side: the same door may be used by either reversing the sample or by creating under-pressure in the test chamber
General	Medium	One test for each side: a separate specimen is required in each case
Special	Ambient/medium	One test from the specified side

6.3 Design and construction

Test specimen construction and finish shall be fully representative of that intended to be used in practice. Any seal used in the door or between the door assembly and the associated construction shall be identical to that intended for application in practice.

EN 1634-3:2004 (E)**6.4 Verification**

Where practicable, the size, thickness and material specification of the door assembly shall be determined before the test to check the construction of the door against the manufacturer's specification and to allow adequate description of the tested assembly.

All gaps through which smoke can leak shall be measured and recorded. Generally these are gaps between the edge of the door leaf/leaves and the door frame, between door leaves and at sill level.

When testing for ambient temperature only leakage to satisfy S_a classification, the gap between the bottom of the door and the sill level may be tightly sealed with an impermeable material.

A full description shall be given of the conditions prevailing at each edge of the door leaf/leaves and the presence and the nature of any seals.

7 Installation of test specimen

The test specimen shall be mounted as in practice, in an associated or supporting construction, in accordance with the manufacturer's instructions, with appropriate gaps and clearances between the fixed and moveable parts.

All gaps between the supporting or associated construction and test frame shall be tightly sealed with an impermeable material.

8 Conditioning

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8.1 Moisture content

The test construction shall be conditioned in accordance with EN 1363-1. Door assemblies made entirely of non-hygroscopic materials, e.g. metal or glass, shall be left in the laboratory for at least three days before testing. Any additional conditioning requirements in the relevant product standard shall also be observed.

8.2 Mechanical conditioning

For details of the requirements on mechanical testing conditioning of the test specimen before smoke leakage testing e.g. operational test or self closing test refer to the requirement and classification standard prEN 14600.

Durability requirements are given in the relevant product standard.

9 Application of instrumentation

9.1 Thermocouples

For the ambient temperature only test to evaluate S_a , two thermocouples shall be used to monitor the temperature in the chamber. These shall be equally spaced across the chamber at mid-height of the test specimen.

For the ambient and medium temperature test to evaluate S_m , nine thermocouples shall be used to monitor and control the temperature inside the test chamber. The thermocouples shall be arranged in three horizontal rows. These thermocouples shall be spread equally across the chamber with three 150 mm from the bottom edge of the opening in the test frame, three in the centre and three at $\frac{3}{4}$ height position. The hot junctions shall be positioned (100 ± 50) mm from the exposed face of the test construction.

9.2 Pressure

The pressure measuring device head (see 4.2.2) shall be mounted in the test chamber at the centre of the test specimen (100 ± 50) mm from the inside face of the test specimen.

9.3 Air flow

The equipment described in 4.2.3 shall be installed.

10 Test procedure

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10.1 Pre-test procedures

10.1.1 General

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After installation of the assembly in the associated or the supporting construction, but before it is mounted in front of the test chamber, each door leaf, or moving element of a hinged door assembly, shall be opened to an angle of 30° and closed 10 times, using the automatic closing devices, if provided, to ensure the assembly operates normally. With other types of doors, such as folding, sliding or rolling shutters, the opening and closing operation shall be carried out as far as practicable to check the operation of the assembly. This procedure is not a durability test, for which special procedures are available.

10.1.2 Retention force measurements

The retention forces for all door assemblies which incorporate closing devices and which are meant to be opened without mechanical power shall be measured. These measurements are needed to establish the magnitude of the forces used to retain the door leaves closed to ensure that they are representative of those used in normal practice.

For each door leaf, the retention force shall be determined as given below. For double action doors the retention force shall be determined for each direction of opening, and for folding doors the retention force shall be determined in the direction of opening.

The retention forces for all door assemblies which incorporate closing devices operated by egressing personnel without mechanical assistance shall be measured as follows:

Open the test door slowly, using a force gauge attached to the handle and operating against the direction of closing, to a distance of the leading edge of the door leaf of 100 mm away from its closed position. Record the highest gauge reading between the closed and 100 mm positions.