



**SLOVENSKI STANDARD**  
**SIST EN 12211:2001**  
**01-september-2001**

**BUXca Yý U**  
**SIST EN 77:1996**

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**Okna in vrata - Odpornost proti obremenitvi z vetrom - Preskusna metoda**

Windows and doors - Resistance to wind load - Test method

Fenster und Türen - Windwiderstandsfähigkeit - Prüfverfahren

Fenêtres et portes - Résistance au vent - Essai

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**ICS:**

91.060.50      Vrata in okna      Doors and windows

**SIST EN 12211:2001**      **en**

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English version

## Windows and doors - Resistance to wind load - Test method

Fenêtres et portes - Résistance au vent - Essai

Fenster und Türen - Windwiderstandsfähigkeit -  
Prüfverfahren

This European Standard was approved by CEN on 20 September 1999.

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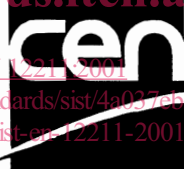
This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 33 "Doors, windows, shutters, building hardware and curtain walling", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by December 2000, and conflicting national standards shall be withdrawn at the latest by December 2000.

According to the CEN/CENELEC Internal Regulations; the national standards organizations of the following countries are bound to implement this 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 standard is one of a series of standards for windows and doors.

This European Standard supersedes EN 77:1977 "Methods of testing windows – Wind resistance tests".

The Annexes A and B are informatives.

## 1 Scope

This standard defines the method of test to determine the resistance to wind load for completely assembled windows and doors of any materials when submitted to positive and negative test pressures.

This test method is designed to take account of conditions in use, when the window or door is installed in accordance with the manufactures specification and the requirements of relevant European Standards and codes of practice.

This standard does not apply to joints between the window or door frame and the building construction. This standard is not intended to evaluate strenth of the glass.

## 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 1026:2000                      Windows and doors - Air permeability - Test method

prEN 12519                      Doors and windows – Terminology

### 3 Definitions

For the purposes of this Standard the definitions given in prEN 12519 apply, together with those given hereafter and in figures A.1 to A.3.

#### 3.1

##### **frontal displacement**

movement of a point on a frame member measured normal to the member

#### 3.2

##### **frontal deflection**

maximum frontal displacement of a frame member minus half the sum of the frontal displacements at each end of the member

#### 3.3

##### **relative frontal deflection**

frontal deflection of a frame member divided by the length of the member over which the frontal deflection was measured, e.g. distance between the ends of the member.

#### 3.4

##### **test pressure**

difference between the static air pressures on the external face and the internal face of the test specimen.

Test pressure is positive if the static air pressure on the external face is higher than that on the internal face.

Test pressure is negative if the static air pressure on the external face is lower than that on the internal face.

For the purpose of these tests, three sets of test pressure are defined :

- P1 applied to measure deflections of parts of the test specimen ;
- P2 pulsating pressure applied for 50 cycles to assess performance under repeated windloads ;
- P3 applied to assess the safety of the test specimen under extreme conditions.

The values of P1, P2, P3 are related as follows:  $P2 = 0,5 P1$  and  $P3 = 1,5 P1$

### 4 Principles of test

Application of a defined series of positive and negative test pressures at which measurements and inspections are made to assess relative frontal deflection and resistance to damage from wind loads.

### 5 Apparatus

5.1 A chamber with an open side to which the test specimen can be fitted. It shall be constructed so as to be able to withstand the test pressures without deflecting to an extent likely to influence the test results.

- 5.2** Means for applying controlled test pressure to test specimen.
- 5.3** Means of producing rapid changes in test pressure, controlled within defined limits.
- 5.4** Instrument suitable for measuring the quantity of air flow into or out of the chamber within an accuracy of  $\pm 5\%$  (calibrated to 20 °C, 101 Kpa).
- 5.5** Means of measuring the test pressure applied across the specimen, within an accuracy of  $\pm 5\%$ .
- 5.6** Devices, such as dial gauges or displacement transducers, for measuring displacements of measured points with an accuracy of 0,1 mm.
- 5.7** Means for fitting the measuring devices properly to ensure their stability during the test.
- 5.8** A measuring tape accurate to  $\pm 1$  mm to measure the length of members to be tested.

## **6 Preparation of test specimen**

### **6.1 Set-up of the test specimen**

The test specimen shall be fixed as intended for use in the works without any twists or bends which may influence the test results. The test specimen shall be fully operable.

The stiffness of the test rig and the fixing of the specimen to it shall be sufficient to avoid adverse effects on the performance of the specimen during testing.

The test specimen shall be cleaned and surfaces dry. Ventilation devices, if any, shall be taped over.

### **6.2 Set-up of measuring devices**

#### **6.2.1 Frontal deflection**

Measuring devices (see 5.6) shall be fixed in position at each end and at the centre of the frame member to be measured. Alternatively, a single measuring device shall be fixed at the centre of a rigid beam that is fixed to and supported only at the ends of the frame member to be measured.

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## **7 Test procedure**

### **7.1 Preliminaries**

The ambient temperature and humidity close to the specimen shall be within the range 10 °C to 30 °C and 25 % to 75 % RH and the specimen shall be conditioned thus for at least 4 h immediately before test.

Figure B.1 shows the sequence of test to be carried out and the set of test pressures, and their features, to be applied.

The test for air permeability in accordance with EN 1026 shall be completed before the wind resistance test to test pressures P1 and P2.

## 7.2 Deflection test

Record the length of the members whose frontal deflection is to be measured.

NOTE : If several displacements or deflections are to be measured, they can be recorded either during one sequence of test pressure steps to P1 or during as many sequences to P1 as there are measurements to be made.

### 7.2.1 Positive pressure

Apply three pressure pulses, each 10 % greater than the test pressure P1. The time to reach the maximum pressure shall not be less than 1 s and it shall be sustained for at least 3 s.

All the gauges shall be set to zero or have their initial reading recorded.

Apply test pressure equal P1 according to the classification required for the specimen, at a rate not exceeding 100 Pa/s, either incrementally or continuously.

When the pressure P1 has been applied for 30 s, record the required frontal deflection(s) or frontal displacement(s).

Reduce the test pressure to 0 Pa, at a rate not greater than 100 Pa/s and after  $(60 \pm 5)$  s record the residual frontal deflection(s) or frontal displacement.

### 7.2.2 Negative pressure

Apply procedure specified in 7.2.1 using negative test pressures.

## 7.3 Repeated pressure test

The test specimen shall be subjected to 50 cycles including negative and positive pressures, with the following features:

- test pressure equal P2;
- first step is negative, next is positive as is the last of the sequence of 50 impulses;
- variation from  $-P2$  to  $+P2$  and the reverse shall take  $(7 \pm 3)$  s;
- value P2 is maintained at least for  $(7 \pm 3)$  s.

After completion of the 50 cycles, open and close the moving parts of specimen and note damage or functioning defects if any.

Repeat the test for air permeability in accordance with EN 1026.

## 7.4 Safety test

The specimen shall be subjected to one cycle including negative and positive test pressure with the following features :

- test pressure equal P3;
- negative test pressure is applied first;



- variation from 0 Pa to – P3 and back from – P3 to 0 Pa shall take  $(7 \pm 3)$  s, the maximum test pressure P3 shall be maintained for  $(7 \pm 3)$  s;
- positive test pressure is applied after a  $(7 \pm 3)$  s rest at 0 Pa
- variation from 0 Pa to + P3 and back to 0 Pa shall be the same duration as for the negative test pressure – P3.

After the safety test record whether the test specimen remains closed and describe any parts of the test specimen which have become detached.

## **8 Test report**

The test report shall include a drawing of the face of the specimen showing the relevant members, the displacement measuring points and the location of any damage and operating defects.

### **8.1 Deflection**

Deflection(s) and displacement, under pressure steps + P1 and –P1 shall be recorded. Relative frontal deflections shall be calculated in the form of fractions with the numerator equal to 1 and the denominator expressed to 3 significant figures.

### **8.2 Repeated pressure**

Record any damage and operating defects.

### **8.3 Safety test**

Any damage and failure which occurs as well as any operating difficulties shall be recorded.

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