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Second edition

Windows and doors — Resistance to wind load — Test method

Fenêtres et portes — Résistance au vent — Méthode d'essai

PROOF/ÉPREUVE

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 162, *Doors, windows and curtain walling*.

This second edition cancels and replaces the first edition (ISO 6612:1980), which has been technically revised.

The main changes are as follows:

— pedestrian door sets have been added to the scope;

— the title has been revised;

— this document has been adapted to the current state of the art using Reference [1].

— the technical content has been precised.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Windows and doors — Resistance to wind load — Test method

1 Scope

This document specifies test method to determine the resistance to wind load of completely assembled windows and pedestrian door sets of any materials when exposed to positive or negative test pressures.

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

This document does not apply to joints between the window or door frame and the building construction.

This document is not intended to evaluate strength of the glass.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 6613, *Windows and doors — Air permeability — Test method*

ISO 22496, *Windows and pedestrian doors — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22496 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
closed
closing condition where movable parts rest in or at the fixed parts in a way in which the movable parts can be *fastened* (3.2) [*latched* (3.3) and/or *locked* (3.4)]

3.2
fastened
closing condition where the movable part is restrained at one or more points by latching and/or locking

3.3
latched
fastened (3.2) condition where the movable part is returned to its *closed* (3.1) position and restrained

Note 1 to entry: The movable part is restrained by either:

a) a self-engaging fastener, or

b) a roller catch, or

c) a latch.

3.4
locked
fastened (3.2) condition where the movable part is further restrained in the *closed* (3.1) position by additional operations to engage integrated locking devices which affect the product's characteristics

Note 1 to entry: The restraining in the closed position is done by additional operations of, for example, handle, key, automatic devices or electronic devices.

Note 2 to entry: Integrated locking devices are, for example, nut bolts or deadbolts.

3.5
frontal displacement
movement of a point on a frame member measured normal to the member

3.6
frontal deflection
maximum *frontal displacement* (3.5) of a frame member minus half the sum of the frontal displacements at each end of the member

3.7
relative frontal deflection
frontal deflection (3.6) of a frame member divided by the length of the member over which the frontal deflection was measured

Note 1 to entry: The length of the member over which the frontal deflection was measured is for example, the distance between the ends of the member

3.8
test pressure
difference between the static air pressures inside and outside of the test chamber

Note 1 to entry: The test pressure is positive if the static air pressure inside the chamber of the test apparatus is higher than that outside the test chamber.

Note 2 to entry: The test pressure is negative if the static air pressure inside the chamber of the test apparatus is lower than that outside the test chamber.

Note 3 to entry: The intended "outside" of the specimen shall be facing to the side, from where the positive pressure is applied.

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

— P_1 applied to measure deflections of parts of the test specimen;

— P_2 pulsating pressure applied for 50 cycles to assess performance under repeated wind loads;

— P_3 applied to assess the safety of the test specimen under extreme conditions.

The relation of P_1, P_2 and P_3 shall conform to the clients' needs or, as a default, use $P_2 = 0{,}5 \times P_1$ and $P_3 = 1{,}5 \times P_1$.

4 Principles of test

The test consists of the application of a defined series of pressures (positive and negative) at which measurements and inspections are made to assess relative frontal deflection and resistance to damage from wind loads.

5 Test 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 the 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 with an accuracy of ±5 % of the measured value for air flows greater than 1 m^3/h and an accuracy of ±0,05 m^3/h for air flows equal to or smaller than 1 m^3/h.

NOTE 1 Accuracy is equal to plus minus the sum of the amount of the error plus the amount of the expanded measurement uncertainty. For values of both error and expanded measurement uncertainty, refer to the last calibration certificate of the instrument.

NOTE 2 For vocabulary of metrology, see ISO/IEC Guide 99.

5.5 Means of measuring the test pressure applied across the test specimen, within an accuracy of ±5 %.

5.6 Devices, such as dial gauges or displacement transducers, for measuring displacements of measured points with a resolution of 0,1 mm and an accuracy of ±5 %.

5.7 Means for fitting the measuring devices properly to ensure their stability during the test.

5.8 A measuring tape accurate to ±1 mm to measure the necessary dimensions (e.g. frame members) of the test specimen.

6 Preparation of the test specimen

6.1 Set-up of the test specimen

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

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

The test specimen shall be cleaned and its surfaces shall be dry.

6.2 Set-up of measuring devices for 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 as close as possible to the ends of the frame member to be measured.

NOTE A frame member can be part of the opening element or the fixed frame.

For positioning of measuring devices, see Figures A.1 to A.4.

7 Test procedure

7.1 Preliminaries

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

The test specimen shall be brought into the defined closing condition in accordance with the manufacturer's instructions.

Figure B.1 shows the test sequence of the 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 ISO 6613 shall be completed before testing the resistance to wind load to test pressures P_1 and P_2.

7.2 Deflection test

7.2.1 General

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

If several displacements or deflections are to be measured, they can be recorded either during one sequence of test pressure steps to P_1 or during as many sequences to P_1 as there are measurements to be made.

7.2.2 Positive pressure

Apply three pressure pulses, each 10 % greater than the test pressure P_1. 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 P_1 according to the classification required for the test specimen, at a rate not exceeding 100 Pa/s, either incrementally or continuously.

When the pressure P_1 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 ± 5) s record the residual frontal deflection(s) or frontal displacement.

7.2.3 Negative pressure

Apply the procedure specified in 7.2.2 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 P_2;

— first step is negative, the next is positive as is the last of the sequence of 50 impulses;

— variation from P_{2-} to P_{2+} and the reverse shall take (7 ± 3) s; value P_2 is maintained at least for (7 ± 3) s.

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

Repeat the test for air permeability in accordance with ISO 6613.

7.4 Safety test

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

— test pressure equal P_3;

— negative test pressure is applied first;

— variation from 0 Pa to P_{3-} and back from P_{3-} to 0 Pa shall take (7 ± 3) s, the maximum test pressure P_3 shall be maintained for (7 ± 3) s;

— positive test pressure is applied after a (7 ± 3) s rest at 0 Pa;

— variation from 0 Pa to P_{3+} and back to 0 Pa shall be the same duration as for the negative test pressure P_{3-}.

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

8 Deflection

Deflection(s) and displacement, under pressure steps P_{1+} and P_{1-} 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.

9 Repeated pressure

Record any damage and operating defects.

10 Safety test

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

11 Test report

The test report shall state the wind load measurement devices used for the test, a drawing of the face and sections of the test specimen showing the relevant members and the displacement measuring points. If needed, it shall record on a drawing or a photograph of the test specimen, the location of any damage and operating defects.

The report shall contain as a minimum the following information:

a) a reference to this document, i.e. ISO 6612:20—;

b) the name of the test institution;

c) the date of the test;

d) all necessary references to identify the test specimen and the method of sampling;

e) all relevant details concerning the dimensions of the test specimen, its materials, design, construction and manufacture and its surface finish and fittings, including building hardware, locking points, their position and specific design (e.g. with/without rear-engaging, mushroom cams), relevant gaskets and/or seals with positions of the gaps where they are seated;

f) the exposed face: opening inwards or outwards;

g) a description of at least one of the following closing conditions:

   — closed,

   — latched, and

   — locked;

h) dimensioned drawings of all relevant details of the test specimen including cross section; the fixing of the frame strikers (number of screws used for the fixing, and details into which material they are screw-fixed) shall be clearly depicted in these drawings;

i) presence of ventilation, type and condition (i.e. closed, taped over etc.);

j) test procedures, including storage and conditioning prior to test, and mounting the test specimen ready for test;

k) the test pressures used;

l) the test climates used;

m) the test results;

n) any deviations from the procedure;

o) any unusual features observed.

