International Standard 6613

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Windows and door height windows — Air permeability test

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International standard ISO 6613 was developed by Technical Committee ISO/TC 162, *Doors and windows*, and was circulated to the member bodies in June 1979.

It has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	Norway
Austria	India	Poland
Bulgaria	Ireland	Romania
Canada	Italy	South Africa, Rep. of
Denmark	Japan	Spain
Finland	Libyan Arab Jamahiriya	Sweden
France	Netherlands	United Kingdom

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Belgium
USA

Printed in Switzerland

Windows and door height windows — Air permeability test

1 Scope

This International Standard defines the method to be used for the air permeability testing of windows to be fitted in exterior walls and supplied in the form of completely assembled and finished units.

2 Field of application

This International Standard applies to all windows including door height windows, made of any material, in their normal operating condition for which they are designed and installed according to the manufacturer's recommendations as in a finished building, bearing in mind the conditions of test as defined below. This International Standard does not apply to the joints between the windows and surrounding components and material.

3 Definitions

3.1 pressure differential : Difference between the absolute air pressure on the external surface of a window and the absolute air pressure on the internal surface of the same window.

The difference is positive when the external pressure is higher than the internal pressure. In the opposite case, it is negative. This pressure is expressed in Pascals[1].

3.2 air permeability : The property of a closed window to let air pass when it is subjected to a differential pressure.

The air permeability is characterized by a flow of air, in standard conditions, expressed in cubic metres per hour as a function of the pressure. This flow may be related to the opening surface area of the window (flow per unit of surface area in cubic metres per hour per square metre), or to the length of opening joints (flow per unit of length in cubic metres per hour per metre), or to the total surface area of the window (flow per unit of surface area in cubic metres per hour per square metre).

3.3 opening light : Any part of a window that can be moved within the main frame.

By convention, the surface area of the opening light is equal to the apparent surface, seen from inside. The area of opening light is calculated from the dimensions used for determining the length of joints.

3.4 length of joints : The sum of all perimeters of all opening lights contained in the test specimen, based on overall dimensions of the apparent surface of such parts, seen from inside.

Where two such movable parts meet, the two adjacent lengths of perimeter shall be counted as only one length.

3.5 specimen area : The area calculated from the overall dimensions of the test specimen.

3.6 standard conditions : For the purpose of this International Standard, the following are considered the standard conditions for determining air flow :

temperature : 20 °C
pressure : 101,3 kPa
air density : 1,202 kg/m^3

Some materials will require an additional test of the window. This test should be carried out with different outside and inside temperatures.

4 Apparatus

The basic test apparatus consists of the following :

a) Chamber with an opening to which the test window is fitted by its surround.

b) Means for providing a controlled differential air pressure across the window.

c) Device for rapid controlled changes of the differential air pressure operating between defined limits.

d) Means for measuring the flow of air into or out of the chamber.

e) Means for measuring the difference in pressure between the two faces of the window.

1) 1 Pa = 1 N/m^2

5 Preparation of windows for testing

A surround for the specimen to be tested shall be prepared. This shall be stiff enough to withstand the test pressures without deflecting to an extent likely to impair jointing or to impose bending stresses on the test specimen. When the installation conditions are known, the specimen shall be installed to simulate these, wherever practical.

The window shall be fixed vertically, square, and without twists or bends.

The window shall be cleaned and dried (free of surface water) in its entirety.

The thickness, type of the glass and the method of glazing shall comply with the requirements of the manufacturer. When there is no specification or when there is a possibility that the window will be used with different glasses, tests shall be carried out with a glass of minimum thickness with respect to the surface area.

6 Preparation for the test

The air temperature of the laboratory and the test chamber shall be measured and recorded in the report.

Three air pressure pulses shall be applied and the rate of application shall be over a period of not less than 1 s. Each pulse shall be maintained for 3 s at least. These pulses shall be at a pressure 10 % higher than P_{max} required for the test, without however being less than 500 Pa.

With the pressure reduced to zero, all operating parts of the window shall be opened and closed five times and finally secured in the closed position.

Extraneous permeability of the apparatus shall be accounted for and preferably eliminated. Extraneous chamber permeability, when measured, shall be determined with the window specimen sealed, at the air pressure differences to be exerted during the window air permeability tests.

The metering equipment for the measurement of the window air permeability may be used for measuring the extraneous permeability or it may be necessary to provide additional air metering equipment.

The method adopted to measure specimen permeability and extraneous permeability shall be clearly stated in the test report.

7 Test

The window shall be subjected to positive pressure increasing in stages for a minimum period of 10 s at each stage up to the maximum pressure required for the test.

The pressures at these stages shall be 50, 100, 150, 200, 300, 400, 500, 600 Pa and can then be increased in steps of 100 Pa maximum if the pressure required for the test is, exceptionally, higher than 600 Pa.

The pressures shall then be applied in the reverse order.

NOTE — If it is required to test a window for air permeability in the reverse direction, i.e., under negative pressure, this same method shall be used.

8 Diagrams

The diagrams in figures 1 and 2 show the sequence of the operation for :

— a required pressure P_{max} lower than 600 Pa, for example, of 300 Pa (see figure 1);

— a required pressure P_{max} higher than 600 Pa, for example, of 700 Pa (see figure 2).

9 Expression of results

The air flow readings at each pressure shall be recorded. The higher of the two readings at each pressure, increasing as well as decreasing, shall be noted in the report.

For each window tested, the recorded volume of air flow passing through the specimen shall be adjusted to air flow in standard conditions using the formula

$$V_{293} = \frac{293}{101,3} \times \frac{pV}{T}$$

where

p is the barometric air pressure, in kilopascals;

V is the volume of measured air flow, in cubic metres per hour;

T is the measured temperature of air flow, in kelvins.

The air permeability shall, at least in one of the following, be expressed as cubic metres of air per hour.

— per square metre of total surface area of the window;

— per square metre of opening light;

— per metre of length of opening joint.

One or more graphs shall be plotted representing all this data which shall be referenced to and included in the test report.

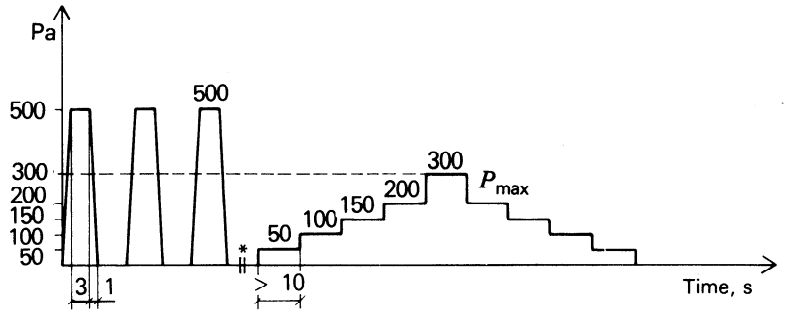

Figure 1 — Example of P_{max} lower than 600 Pa

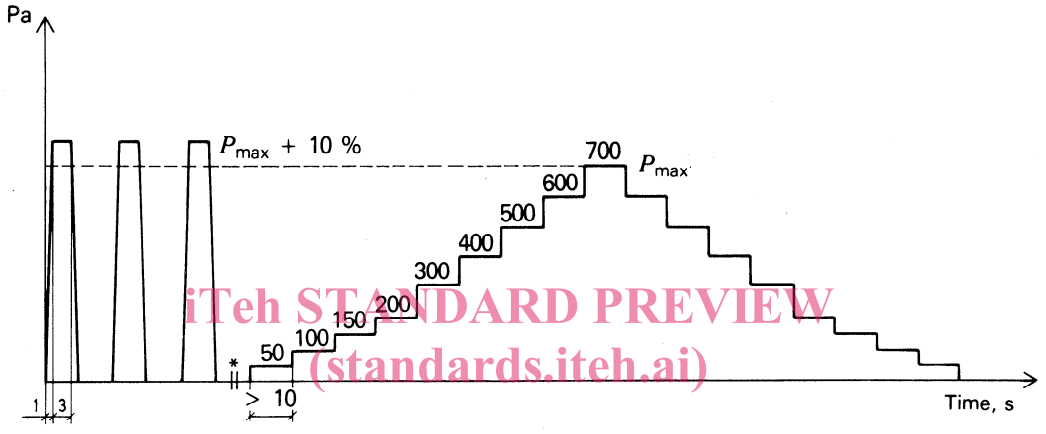

Figure 2 — Example of P_{max} higher than 600 Pa

* Indicates opening and closing

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