International Standard 6589

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Joints in building — Laboratory method of test for air permeability of joints

Joints dans le bâtiment — Méthode d'essai en laboratoire de perméabilité à l'air des joints

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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 6589 was developed by Technical Committee ISO/TC 59, *Building construction*.

This second edition was submitted directly to the ISO Council, in accordance with clause 6.11.2 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 6589-1981), which had been approved by the member bodies of the following countries :

Australia	Israel	Romania
Austria	Italy	South Africa, Rep. of
Canada	Japan	Spain
Cyprus	Korea, Rep. of	Sweden
Czechoslovakia	Libyan Arab Jamahiriya	Thailand
Egypt, Arab Rep. of	Mexico	Turkey
France	New Zealand	United Kingdom
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Hungary	Poland	

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

Belgium
Denmark

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Joints in building — Laboratory method of test for air permeability of joints

0 Introduction

The establishment of levels of performance for joints in buildings has to be based on tests that will simulate the constraints associated with their behaviour in service. The functions that a joint has to perform have been listed in ISO 3447. The method of test specified in this International Standard deals with point A.8 of subclause 3.1 of ISO 3447. The method has been adapted from a standard test for the air permeability of windows. Care should be taken in relating the results of laboratory tests on joints to their actual performance on site.

1 Scope

This International Standard specifies the test method to be used in laboratories for assessing the air permeability of non-opening joints in the exterior walls of buildings, whether the joints have been subjected to prior ageing or not.

2 Field of application

This International Standard applies to joints between components used in the exterior walls of buildings and fixed according to the manufacturer's recommendations. This International Standard does not apply to joints within components (for example the joint between glass fixed in a window frame and sealed with a glazing compound), but applies to the joint between glass mounted in a fixed window frame on site.[1)]

Joints whose efficacy depends on the susceptibility of materials to degradation over a period of time shall be tested after having been subjected to simulated ageing.

3 References

ISO 2444, *Joints in building — Vocabulary*.

ISO 3447, *Joints in building — General check-list of joint functions*.

4 Definitions

For the purpose of this International Standard, the definitions given in ISO 2444, together with the following, apply.

4.1 differential pressure : Difference between the absolute air pressure on the external surface of a joint and the absolute air pressure on the internal surface of the same joint. The difference is positive when the external pressure is higher than the internal pressure. In the other case, it is negative. The differential pressure is expressed in pascals (Pa).

4.2 air permeability : Inability of a joint to resist the passage of air when it is submitted to a differential pressure across it. The air permeability is characterized by a flow of air expressed in cubic metres per hour per metre as a function of the differential pressure.

NOTE — This flow may be related to joint length (flow per unit of length in cubic metres per hour per metre), or, for a junction[2)] between two joints, to the flow at the junction (flow in cubic metres per hour). Where the distribution of joints (length and junction) in an element is known, the flow may also be related to the element surface area (flow per unit of surface in cubic metres per hour per square metre).

5 Apparatus

The basic test apparatus comprises the following :

5.1 Chamber which can be sealed and pressurized with an opening in one side into which a length of joint at least 1 m long and associated components can be fitted.

5.2 Means of providing a controlled differential pressure across the joint.

5.3 Device for rapid controlled changes of the differential pressure operating between defined limits.

1) See also ISO 6613, *Windows and door height windows — Air permeability test.*

2) Intersections of joints.

5.4 Means of measuring the flow of air into or out of the chamber.

5.5 Means of measuring the differential pressure between the two faces of the joint, i.e. between the joint surfaces at any part of the wall or of the partition to be tested.

6 Preparation of the joint for testing

The joint to be tested shall be installed between actual components so as to withstand the test differential pressures without deflecting to an extent likely to impair the joint or affect its performance.

The components surrounding the joint shall be chosen to represent the nature of the surface likely to occur in practice. Any irregularities on that part of the component surface in contact with any jointing product shall be tested for their effect on air permeability.

The joint shall be installed so that its external surface forms a part of the internal face of one wall of the chamber for a positive differential pressure and vice versa for a negative differential pressure (see 8.3).

7 Preparation for test

Extraneous air leakage from the chamber, not imputable to the joint, shall be measured and preferably eliminated. When the extraneous air leakage is measured, it shall be determined with the joint specimen sealed and at the differential pressures to be exerted during the joint air permeability tests. (Care shall be taken to ensure that the joint is well sealed over its face and at its ends.)

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

The method adopted to measure the air leakage shall be stated in the test report. The air temperature of the laboratory and the test chamber shall be measured and recorded in the test report.

8 Test

8.1 Tests for the following four conditions of installation shall be made to determine the effects of dimensional deviations :

a) Nominal joint width with the external surfaces of the adjacent components forming the joint correctly aligned.

b) Minimum specified joint width with the external surfaces of the adjacent components forming the joint correctly aligned.

c) Maximum specified joint width with the external surfaces of the adjacent components forming the joint correctly aligned.

d) Joint width varying from minimum to maximum width along length, and with adjacent components forming the joint misaligned in the opposite direction to the plane of the component surfaces (in the direction perpendicular to the faces of the components) within given limits.

Junctions between joints shall also be tested under conditions a) to d) above. To test a junction, for example between a vertical joint and a horizontal joint, first test the junction formed between lengths of the two types of joint and then test separate lengths of the two types of joint. The effect of the junction itself is then calculated by subtracting the air flows through the two separate joints (correcting for length as appropriate) from the air flow through the complete assembly.

8.2 Three positive differential pressure pulses increasing from 0 to maximum over a period greater than 1 s shall be applied to the test chamber. Each pressure shall be maintained for at least 3 s. These pressures shall be 10 % higher than the maximum differential pressure P_{max} required for the following part of the test (see 8.3) without however being less than 500 Pa (see the figure).

8.3 The joint shall then be subjected to increasing positive differential pressures in stages of at least 10 s duration up to the maximum differential pressure required for the test. This maximum differential pressure shall be calculated from the velocity of the wind acting on the joint in its intended location in use. These differential pressures shall be 50, 100, 150, 200, 300, 400, 500, and 600 Pa and can then be increased gradually in steps of 250 Pa maximum if the differential pressure required for the test is, exceptionally, greater than 600 Pa. The differential pressures shall then be applied in the reverse order. The figure shows the sequence of operations for a required differential pressure P_{max} less than 600 Pa, for example of 300 Pa [see the figure, a)] and for a required differential pressure of P_{max} greater than 600 Pa, for example of 700 Pa [see the figure, b)].

8.4 The test shall be repeated with negative differential pressures by reversing the installation of the joint so that its interior surface forms a part of the internal face of one wall of the chamber.

9 Expression of results

The air permeability at each differential pressure shall be recorded to the nearest 0,1 m^3/h. The higher of the two flow readings for each pressure (measured once during the increasing phase and then during the decreasing phase) shall be noted in the test report, together with the accuracy to be expected from the measuring instruments used.

For each joint tested, the air permeability, expressed in cubic metres of air per hour, shall be recorded :

a) per metre of length of each type of joint;

b) for each junction location (intersection of joints).

In addition, if the distribution of joints (length and junctions) for an element is known, the flow per unit of surface of the element can be given.

The air permeability shall be plotted against increasing differential pressure and the graphs shall be included in the test report.

If necessary, corrections shall be made for any extraneous air leakage from the chamber (see clause 7).

10 Test report

The test report shall include at least the following information :

a) a diagram of the test apparatus or its reference;

b) details of the installation of the test joint;

c) ambient air temperature of the laboratory and test chamber at the time of testing;

d) the method of measuring the extraneous air leakage of the test chamber and its value, in cubic metres per hour, at each differential pressure;

e) a full description of the joint with sectional diagrams to show its construction and specifications of any jointing products and any junction;

f) the results obtained during each test in accordance with clause 9;

g) the name of the testing organization and the date of the test;

h) description of simulated ageing cycles, if applicable.

In addition, the test report shall state explicitly that the results are valid only for the conditions under which the test was made.

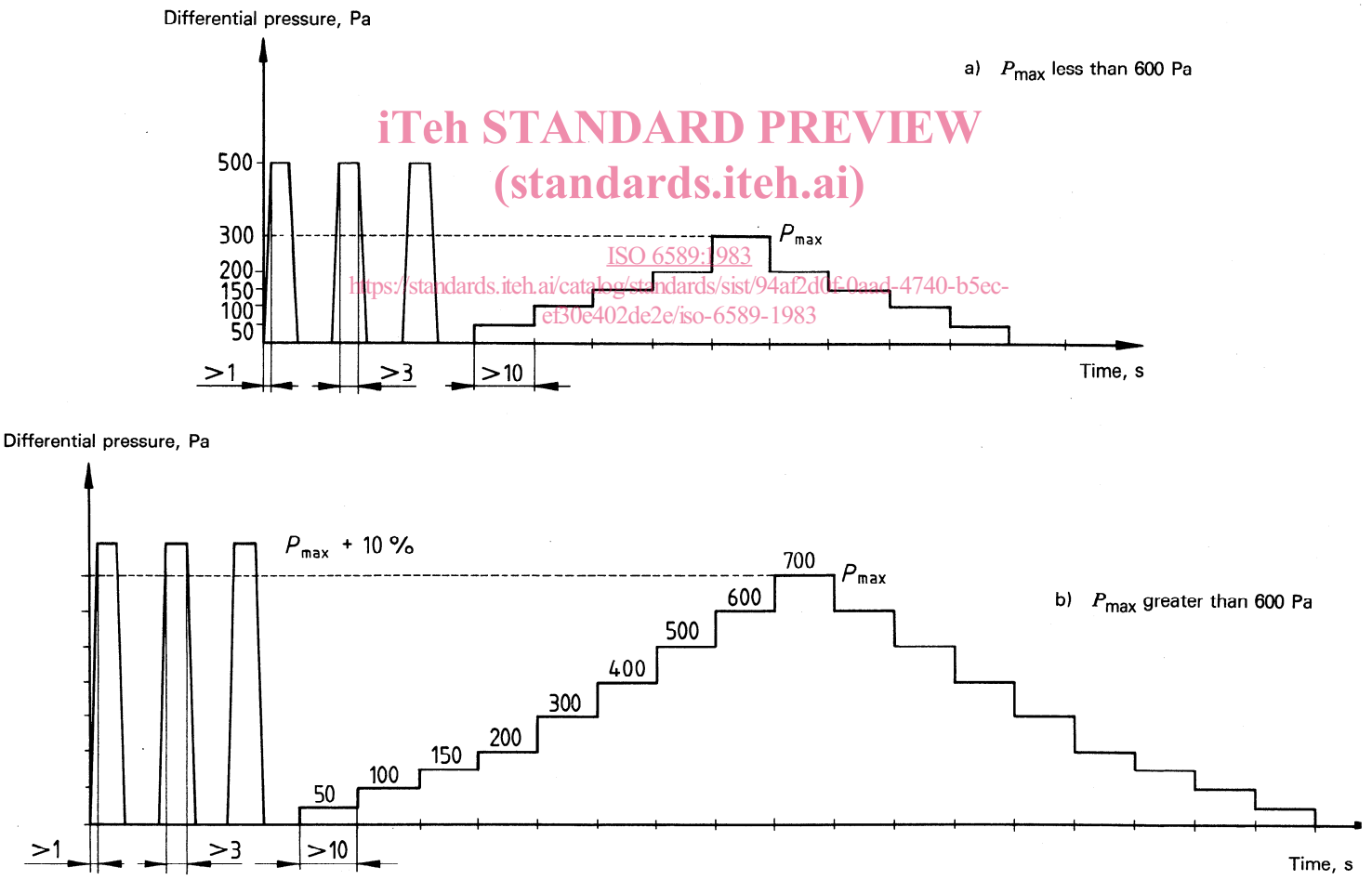

Figure — Sequence of differential pressure application

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