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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Partitions made of components — Test for resistance to wind (static pressure and slamming doors)

Cloisons construites avec des composants — Essais de résistance aux effets du vent (pressions statiques et battements de porte)

Reference number
ISO 7894 : 1987 (E)

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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7894 was prepared by Technical Committee ISO/TC 59, *Building construction.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Partitions made of components — Test for resistance to wind (static pressure and slamming doors)

0 Introduction

0.1 This International Standard is one of a series of standards relating to the performance of building elements.

This series comprises:

— firstly, performance standards which indicate the type of performance characterizing each family of elements — façades, partitions, roofs, cross-walls, tridimensional units — making up a building with their scales of values, if required, and which also refer to suitable methods for determining performance,

— and, secondly, International Standards applicable to each family of elements, describing the means (measurement, calculation, test method or method of examination) by which a certain performance achieved by the element is to be evaluated or verified, and/or the means of forecasting the life expectancy.

In conjunction with this series of standards, another series will also be established defining the rules pertaining to dimensional coordination and modular coordination for the different families of elements, given that they and performance are so related that some correlation is desirable.

0.2 When windows are open in a building, the wind generates positive and negative pressures on partitions and causes doors to slam.

When there is insufficient prior knowledge on the behaviour of partitions when submitted to positive and negative pressures due to wind, tests simulating these actions may help to procure the necessary information.

This International Standard proposes test methods for measuring the deformations undergone by a partition under positive and negative pressure and for observing any deterioration.

1 Scope

This International Standard defines the method to be used for testing the resistance to positive and negative static air pressure of complete partitions made of components, i.e. of the assembly consisting of partition components, overpanels and doors, their connections and the devices fixing them to the structure. It also specifies the method for assessing the effect of slamming doors.

2 Field of application

This International Standard applies to all types of partitions made of components, made of any material, set up in compliance with general rules of good practice and the supplier's recommendations[1].

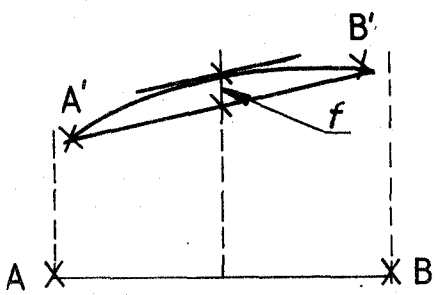
3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 permanent residual deformation : Deformation which does not disappear when pressures are no longer applied.

3.2 frontal displacement : Displacement of a point on the partition measured normal to the plane of the partition.

3.3 frontal deflection : Maximum frontal displacement of a point on a partition element or on a structure. If displacement of the edges A and B of this element occurs, the deflection is measured with respect to the final position A′ and B′ of these edges (see figure 1).



f is the frontal deflection of the element AB which, when deformed, becomes A′ B′.

Figure 1 — Frontal deflection

1) These may refer to general or specific rules, for the prevailing conditions of construction and use.

3.4 relative frontal deflection : Relationship of the frontal deflection to the initial dimension AB of the element under examination; in the case of figure 1, it is the relationship $\frac{f}{AB}$.

4 Test principle

The tests consist in submitting the partition :

a) to static pressure applied in stages and subsequently recording the deflections and deformation observed and any damage. The partition tested is distinguished by the deformation/pressure curve at various points after increasing the pressure up to the maximum required pressure p_1, or to the pressure at which parts fall off, or at which the failure of fixings or the slipping of supports occurs, if this pressure is less than p_1;

b) to a slamming door, simulating its sudden closure due to wind;

c) to increasing static pressure, until deterioration and possibly failure occurs, if this state is not reached in the first sequence at the pressure p_1. If failure does not occur the maximum pressure attained is recorded.

Depending on the performance requirements, the application of the test may be limited to one sequence of tests, or to several.

5 Test apparatus

The test apparatus comprises the following :

a) Rigid frame, i.e. the frontal displacements of which are at no point more than 0,1 mm at 100 Pa, suitably equipped to allow attachment of the proposed fixings without being subject to deformation, and adaptable to the characteristic dimensions of the specimen without being more than 6,00 m wide.

b) Chamber [1] capable of covering the whole panel and all of the joints, placed against the partition to be tested. A device attached to the chamber ensures that the connection is tight all the way round.

c) Means of providing a controlled differential air pressure across the partition.

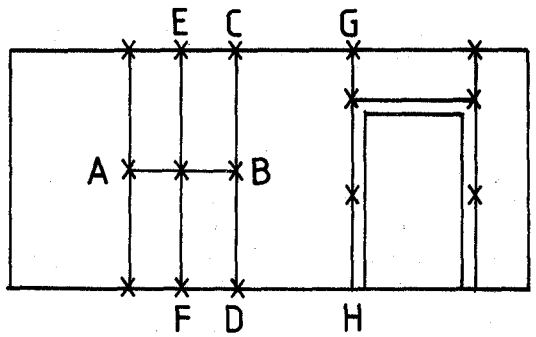
d) Means for measuring the pressure differential [2] between the two faces of the partition with an accuracy of 10 Pa.

e) Devices for measuring the frontal displacements of the specimen (frontal displacements in the direction of positive and of negative pressure and any permanent deformation) to the nearest 0,5 mm, and means to position these devices and ensure their stability during the test.

6 Preparation of partition for testing

6.1 Composition of specimen

The specimen shall comprise at least three standard components placed side by side and supplemented either by a component with a door or by a doorset and overpanel; it may also comprise an additional component if necessary, the whole being of the maximum height (see figure 2) for the type of partition being tested.



x = measurement points

Figure 2 — Test specimen

The way in which the components are fixed to each other shall reproduce operating conditions, particularly with respect to the nature, type and position of the fixings and the distance between them.

Unless otherwise indicated by the manufacturer, the door used shall not be equipped with a shock absorber (elastic joint, etc.).

6.2 Fixing of specimen

The specimen shall be fixed onto the frame so as to reproduce operating conditions, particularly with respect to the nature, type and position of the fixings, and the distance between them.

The devices which ensure that the specimen is fixed shall be adjusted so that it is in a vertical plane and its constituent elements (standard and special panels) are assembled in the appropriate planes.

The devices ensuring that the partition is properly fixed shall be assembled so as to make maximum use of their adjustment capacity, i.e. the deviations on the loadbearing frame shall be the maximum permitted ones.[3]

1) The sealed chamber may be replaced by an air cushion.

2) If an air cushion is used, the pressure differential is measured between the air in the cushion and the ambient air.

3) Where permitted deviations are fixed in standards, the adjustment capacity of the fixings shall correspond to the values fixed; where there are no relevant standards available, these values shall be fixed in the test instructions.

6.3 Preparation for testing

To seat the specimen, three air pressure pulses shall be applied; the duration over which the pressure is increased shall not be less than 1 s and the pressure shall be maintained for at least 3 s.

These pulses shall attain the pressure p_1, without, however, being less than 500 Pa as an absolute value.

6.4 Points for measuring frontal displacement

The devices for measuring frontal displacement shall be positioned so as to register the maximum deformations.

Examples of measurement points are indicated in figure 2.

In addition, measurements shall also be taken at other particular points.

7 Test procedure

7.1 General

The specimen shall undergo the following sequences of tests in conformity with clause 4.

7.2 Deformation test

Submit the partition to pressure, increasing in stages of 50 Pa[1] for a minimum period of 10 s at each stage, up to the maximum pressure required (p_1) for this test.

At each pressure stage the frontal displacement at the points indicated and described in 6.4 shall be measured and any irregularities recorded.

With the pressure reduced to 0, note the residual permanent frontal displacements at these points after stabilization. Any cracks shall be traced and their width measured.

7.3 Slamming door test

The volumes on either side of the specimen shall be connected to each other.

Hook a piece of wire to the door inserted in the specimen at a height of 1,0 m, in the vicinity of the outer edge of the door leaf, and tie it to a free-falling mass of 15 kg via a pulley system.

Without initial speed release the door, which is thus tied to the moving weight, from its position open at an angle of 60°; halt the fall of the weight at the moment the door knocks against the door frame, so that the impact energy is only due to the speed gained by the door (see figure 4).

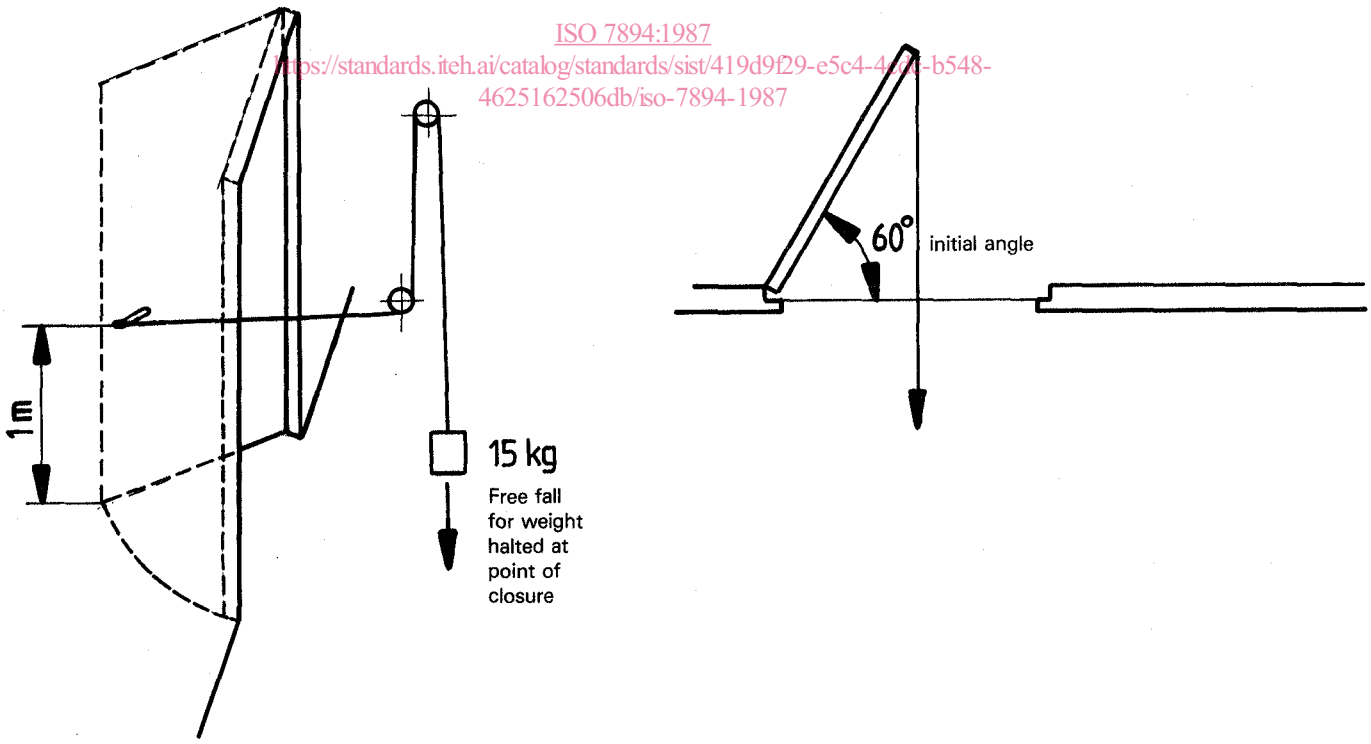


Figure 3 — Slamming door test

1) 1 Pa = 1 N/m^2 = 0,102 mm water

Repeat the test n times, n being 10, 100, 1000, etc., and record the appearance of any damage to the partition.

7.4 Failure test

Submit the partition once more to pressure, increasing in stages of 100 Pa for a minimum period of 10 s at each stage, until parts fall off or there is failure of fixings or slipping of supports.

At each pressure stage measure the frontal displacements at the points indicated as in 7.2 and record any irregularities.

If failure does not occur, note the maximum pressure attained.

8 Expression of results

The frontal displacements and permanent deformations shall be expressed in millimetres. The pressure is expressed in pascals.

9 Test report

The test report shall contain the following :

a) a diagram of the test apparatus or reference to a document containing relevant information;

b) a detailed drawing of the partition tested or reference to supplier's documents in which this is described. This drawing shall show the exact position of the fixing devices and shall include information on their adjustment;

c) the position of measurement points;

d) diagrams indicating the procedure followed, with details of pressure values;

e) frontal displacements and any permanent deformations recorded for each test;

f) the damage observed during each of the tests, recorded on the sketch of the specimen.

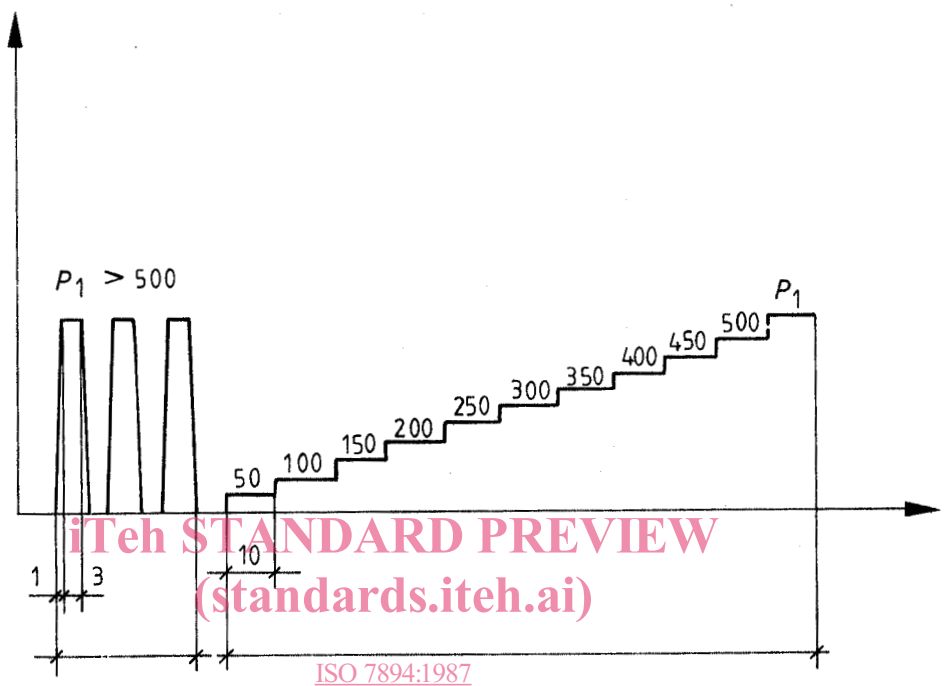
The temperature and humidity of the air of the laboratory or box shall be noted and stated in the report.

The results of the deformation tests shall be expressed (in graph form) as a function of the pressure for each measurement on the segments indicated on the sketch (see 7.2 and figure 2) (AB, CD, EF, etc.). Any warping of the doorset shall be determined.

The report shall make clear whether or not the test has been conducted up to the pressure p_1 and if it has been continued further, the maximum pressure reached shall be stated.

Annex

Typical programme of application of pressure



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