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Doorsets and windows — Water-tightness test under dynamic pressure — Cyclonic aspects

Blocs portes et fenêtres — Essai d'étanchéité à l'eau sous pression dynamique — Aspects cycloniques

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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.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 15821 was prepared by Technical Committee ISO/TC 162, *Doors and windows*.

Doorsets and windows — Water-tightness test under dynamic pressure — Cyclonic aspects

1 Scope

This International Standard specifies a test method for determining the water-tightness under dynamic pressure of doorsets and windows, assembled for normal use and installed as in practice.

This International Standard is applicable to areas subject to severe weather, e.g. that are heavily weather-beaten, stricken by driving rain and wind, including typhoons, hurricanes, cyclones and other severe climate.

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

2 Normative references

The following referenced documents are indispensable for the application 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 1804, *Doors — Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1804 and the following apply.

3.1
pressure differential
differential air pressure between the external and internal faces of the test specimen

3.2
dynamic pressure
pressure differential which cyclically pulsates in approximate to a sine wave, applied to the external face of the test specimen

3.3
upper limit value
P_{max}
upper limit value of dynamic pressure during the test

3.4
median value
P
median value of dynamic pressure during the test, required by product specification or agreed between the parties concerned

3.5
lower limit value
P_{min}
lower limit value of dynamic pressure during the test

3.6
water tightness
ability of the closed test specimen to resist water penetration

3.7
water penetration
continuous or repeated wetting of the parts of the building and components that are not designed to be wetted

4 Principle

A specified amount of water is sprayed constantly across the external face of the test specimen under dynamic pressure. If water penetration is observed visually, the location where water penetration has occurred is recorded.

5 Test specimen

5.1 Test specimen

The test specimen shall be such that it is completely assembled for normal use and installed as in practice.

5.2 Glazing for test specimen

If the test specimen contains a glazed area, it shall be glazed in compliance with the requirements of the manufacturer. If no glass thickness is specified, the test shall be carried out with the minimum glass thickness specified by the manufacturer.

6 Test apparatus

6.1 General

The test apparatus shall be a mechanical device having the elements as designated in Figure 1.

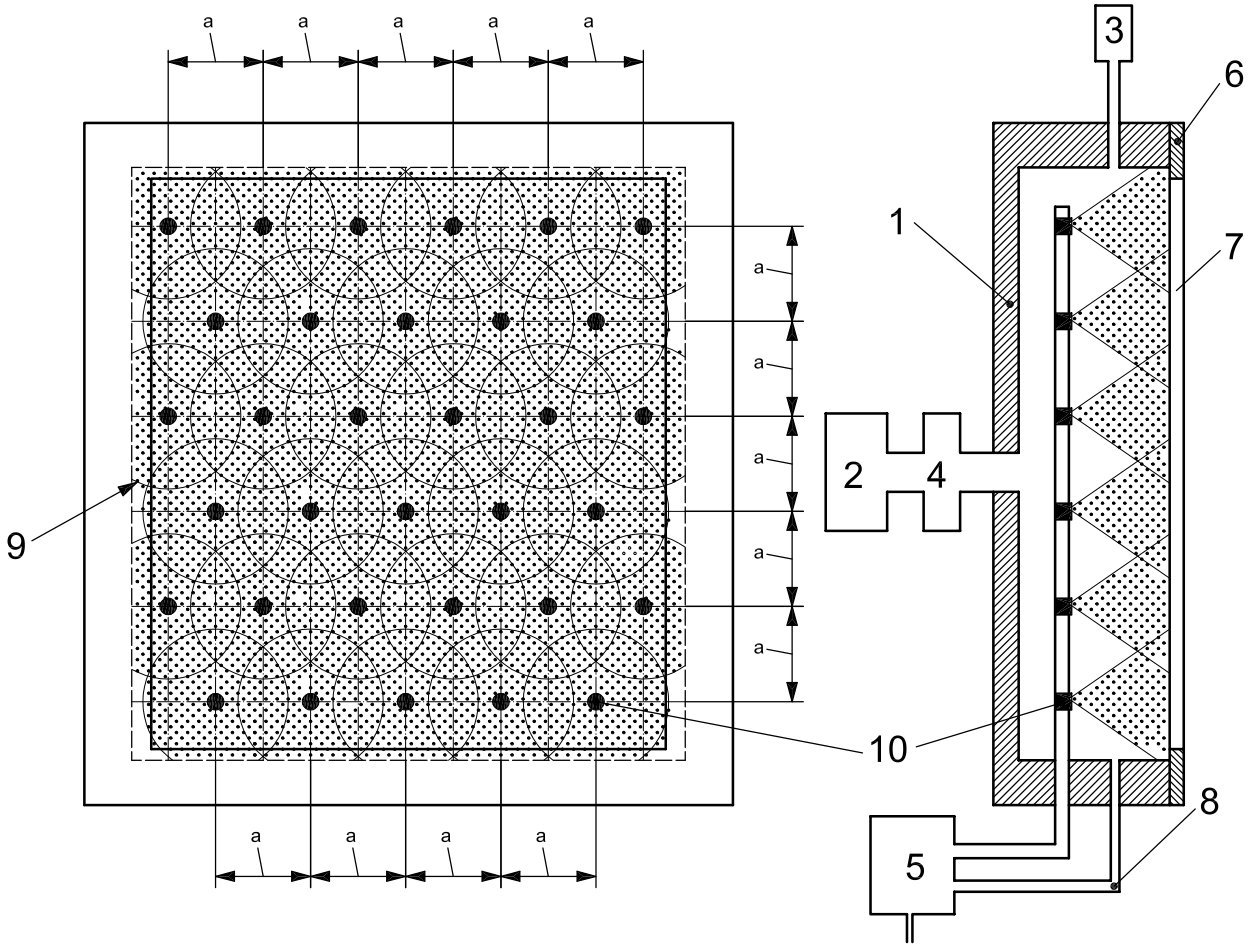
6.2 Pressure chamber

The pressure chamber shall be constructed to maintain the internal pressure at a certain level and to support the attaching rig, and shall be equipped with water spray nozzles.

The pressure chamber shall have an overflow drainage or water tank so that the specimen is not flooded by sprayed water.

6.3 Pressurizer

The pressurizer shall be able to apply controlled pressure to the weather-exposed face of the test specimen.



a) Front view of spraying **b) Cross-section of testing chamber**

Key

1	pressure chamber	6	test-specimen attaching rig
2	pressurizer	7	test specimen
3	device for measuring pressure differential	8	drain
4	device for generating pressure	9	area sprayed by nozzle
5	device for spraying water	10	water-spray nozzle

[a] The distance between nozzles in the same row and the distance between the rows of nozzles are equal.

Figure 1 — Example of test apparatus

6.4 Device for measuring pressure differential

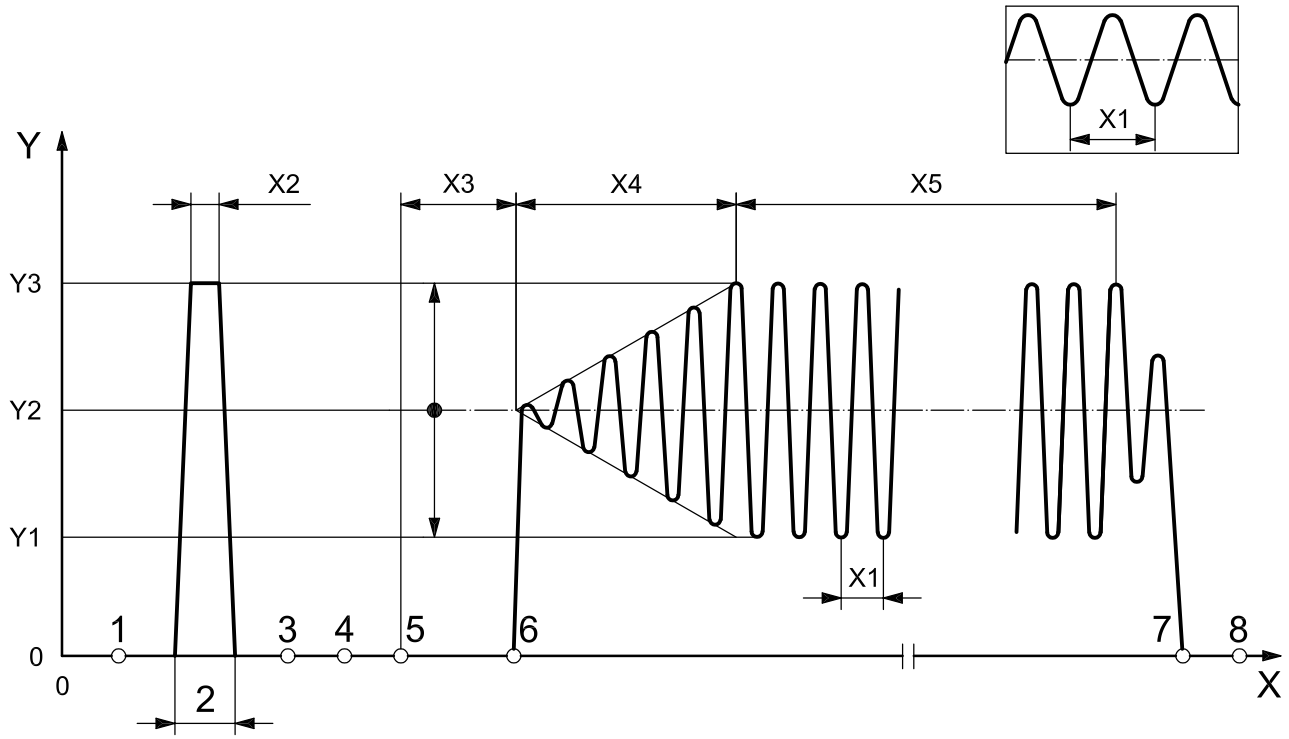
The device shall be able to measure the pressure differential, with ± 3 % accuracy, between the external and internal faces of the test specimen.

6.5 Device for generating dynamic pressure

The device shall be able to produce dynamic pressure, as shown in Figure 2 and Table 1. The dynamic pressure cycles at intervals of 2 s to 4 s, with a tolerance of ± 0,2 s to ± 0,4 s.

NOTE The selected interval cycle shall be kept unchanged during the test.

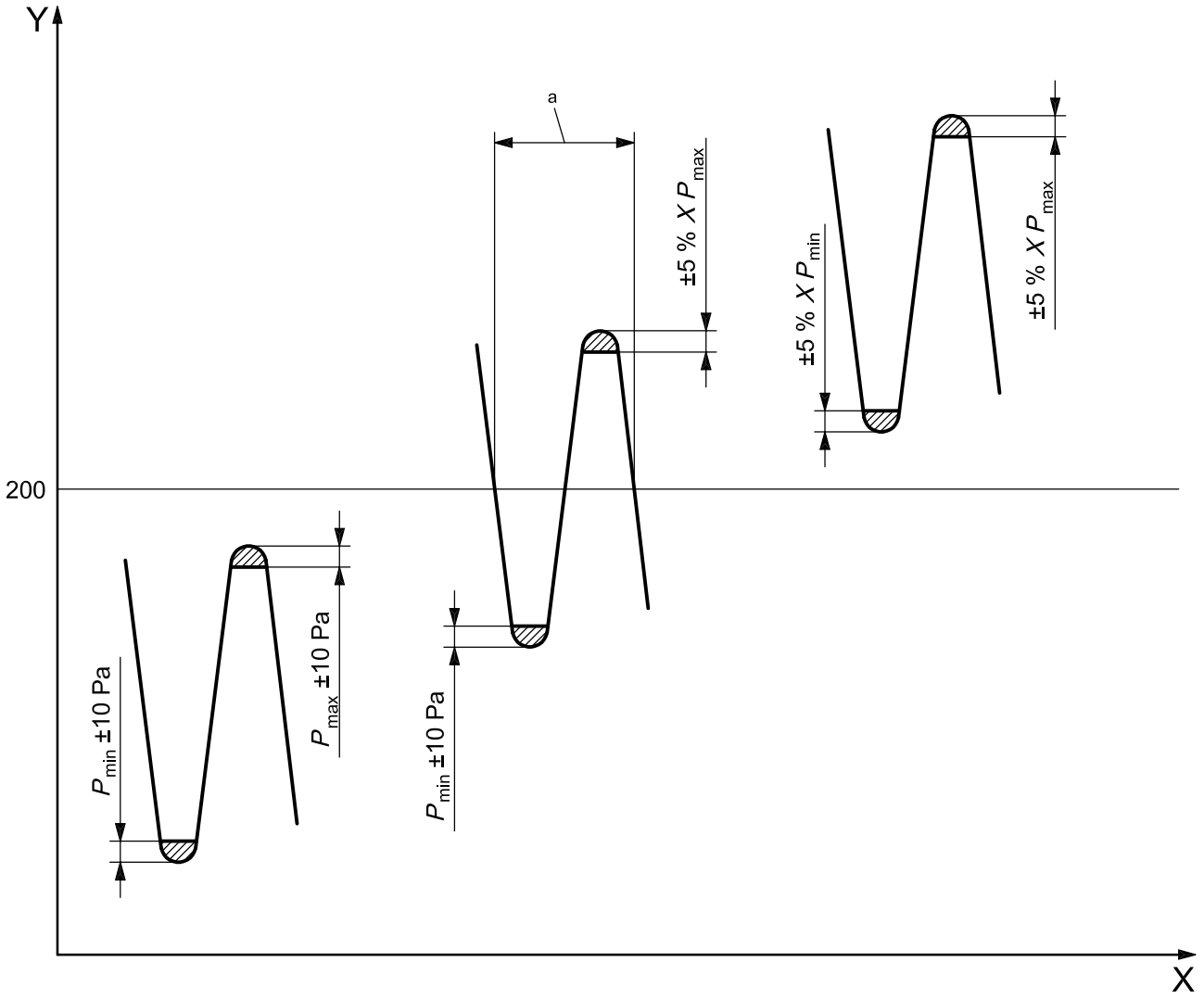
The permissible range of generating dynamic pressure shall be regulated within ± 10 Pa of a pressure below 200 Pa, and/or within ± 5 % of a pressure at 200 Pa and more, as shown in Figure 3.



Key

X pressurization time
X1 2 s to 4 s
X2 1 min
X3 $\leqslant$ 30 s
X4 increments
X5 10 min pressurization time
Y pressure differential, expressed in pascals
Y1 lower limit value, P_{min}
Y2 median value, P
Y3 upper limit value, P_{max}
1 actuation
2 preparatory pressurization
3 observation start
4 water-spraying start
5 affirmation of required amount of water flow
6 pressurization start
7 pressurization and observation end
8 water-spraying end

Figure 2 — Test procedure chart



Key

X pressurization time

Y pressure differential, expressed in pascals

a 2 s to 4 s.

Figure 3 — Permissible range of pressure differential applied to the specimen

6.6 Device for spraying water

The device shall be able to spray the required amount of water across the weather-exposed face of the test specimen.

The flow meter is allowed a ± 10 % accuracy.

6.7 Test specimen attaching rig

The test specimen attaching rig shall be of such a construction that it is possible to install the test specimen as in normal use and practice, it shall fit into the pressure chamber and shall withstand the pressures applied.

7 Test procedure

7.1 Installation of test specimen

The test specimen shall be fixed plumb, square, and without twists and bends. The test rig shall be firmly fixed to the pressure chamber. The test specimen shall be attached to the test rig so that no water leakage occurs between the frames of the test specimen and the test specimen attaching rig. However, a leakage between the attaching rig and the pressure chamber is permitted unless it prevents the observation.

7.2 Procedure

7.2.1 General

The test shall be carried out in accordance with 7.2.2 through 7.2.6.

7.2.2 Opening and closing actuation

Prior to the test, open and close the opening parts, if any, of the test specimen five times and secure in closed position.

7.2.3 Preparatory pressure

Apply static pressure for 1 min to the internal face of the test specimen, at the upper limit value of the test.

7.2.4 Water spraying

Spray water across the weather-exposed face of the test specimen. The amount of water shall not be less than 3 $l \cdot m^2 \cdot min^{-1}$ to 4 $l \cdot m^2 \cdot min^{-1}$. The water is sprayed continuously and evenly over the whole test area and runs down the surface of the specimen as a dispersed film of water.

7.2.5 Dynamic pressure applied

Within 30 s after the water spraying reaches the required amount, apply dynamic pressure for 10 min to the weather-exposed face of the test specimen, as shown in Table 1, as the water is kept on spraying with the required amount.

The pressure accelerates up to the median value, P, in increments of almost 20 Pa/s, not necessarily in a pulsating sine wave.

Table 1 — Pressure differential of the test

Pressurization median value Pa	**Dynamic pressure**			
	Median value Pa	**Upper limit** Pa	**Lower limit** Pa	**Cycle duration** s
$< 1\,500$	P	$P \times 1{,}5$	$P \times 0{,}5$	2 to 4
$> 1\,500$	P	$P + 750$	$P - 750$	
NOTE See Annex A (informative).				

7.2.6 Observation

Observe visually the internal face of the test specimen and note any location where water penetration has occurred, if any.

8 Expression of results

The test result shall be recorded with the following items:

a) pressure differential (as the median value, P);

b) location of water penetration;

c) other items deemed relevant to the test results.

9 Test report

The test report shall contain the following information:

a) designation, type, detailed drawings and dimension of the test specimen;

b) thickness, type of glass and glazing method;

c) test results, specifying the dynamic pressure interval cycle and the amount of spraying water applied during the test;

d) names of testing organization and of person in charge and date of the test;

e) other items deemed relevant to the test results.

Annex A
(informative)

Common example of test-pressurization phases

A.1 General

This annex is for reference only and does not form a normative part of this International Standard.

This annex applies to the case of not stipulating a median value, P, (3.4) in 7.2.5 and specifies the sequential pressurization phases.

A.2 Pressurization phases

The median value, P, is increased in increments and the test is carried out in sequential phases in the order shown in Figure A.1. The water-tightness shall be assessed at the median value maintained before water penetration.

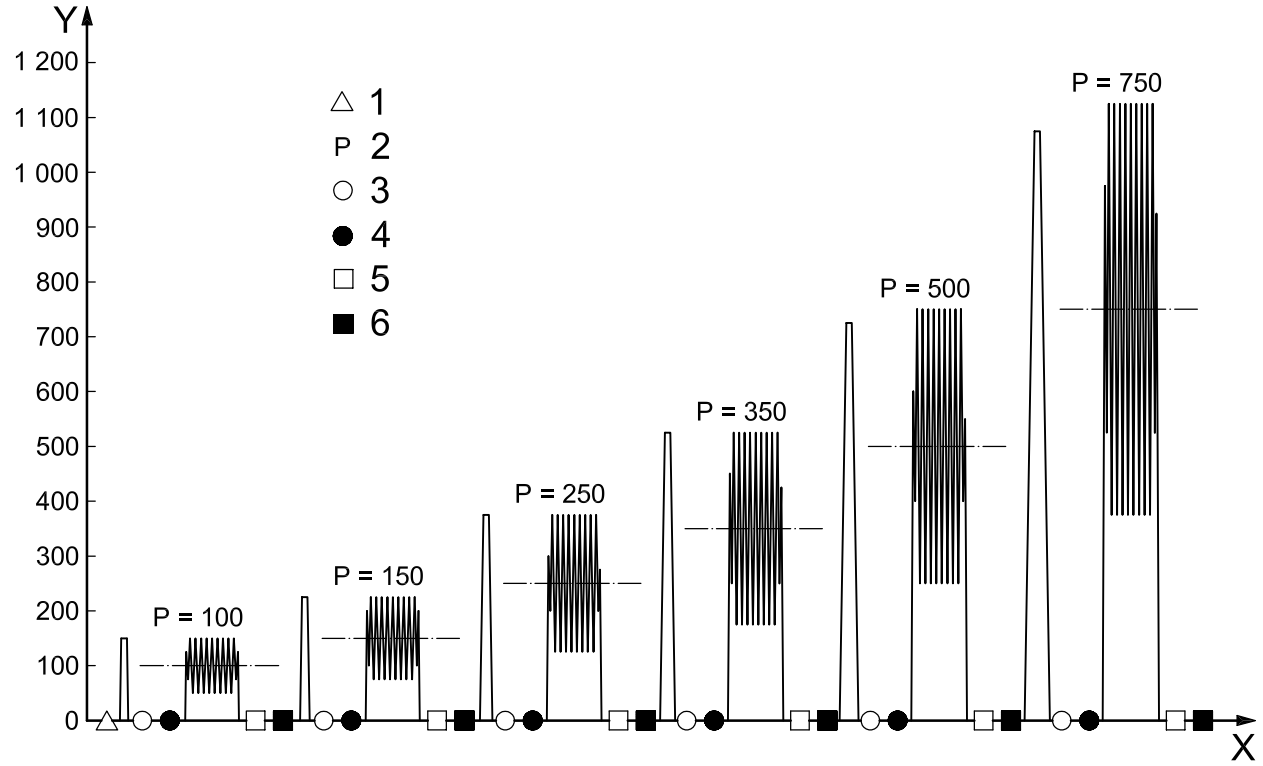
The sequence of median values, P, for the phases is as follows:

100 Pa, 150 Pa, 250 Pa, 350 Pa, 500 Pa, 750 Pa, thereafter in steps of 250 Pa

Opening and closing actuation: shall be conducted at the first test phase, but can be skipped at the next levels; see 7.2.2.

Preparatory pressure shall be evaluated at every phase as a safety precaution to ascertain whether the test specimen can withstand the level; see 7.2.3.

Water spraying shall be carried out during each phase but stopped at the end of the phase. No water shall be sprayed in the interval between the test phases; see 7.2.4.



Key

X time of pressurization phases
Y pressure differential, expressed in pascals

1 opening and closing actuation
2 median value
3 observation start
4 water spraying start
5 observation end
5 water spraying end

Figure A.1 — Example of pressurization phases

Table (A.1) gives the pressure range applied, expressed in pascals, at each phase.

Table A.1 — Pressure range of phases

Phase (median value) Pa	**Pressure range** Pa	
	Min.	Max.
100	50	150
150	75	225
250	125	375
350	175	525
500	250	750
750	375	1 125

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