



SLOVENSKI STANDARD
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Hygrothermal performance of building components and building elements -
Determination of the resistance of external wall systems to driving rain under pulsating
air pressure

Wärme- und feuchteschutztechnisches Verhalten von Bauteilen - Bestimmung des
Widerstandes des Außenwandsystems gegen Schlagregen bei pulsierendem Luftdruck

Performance hygrothermique des composants et parois de bâtiments - Détermination de
la résistance a la pluie battante des systemes de murs extérieurs sous pression d'air
pulsatoire

Ta slovenski standard je istoveten z: EN 12865:2001

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Hygrothermal performance of building components and building elements - Determination of the resistance of external wall systems to driving rain under pulsating air pressure

Performance hygrothermique des composants et parois de bâtiments - Détermination de la résistance à la pluie battante des systèmes de murs extérieurs sous pression d'air pulsatoire

Wärme- und feuchteschutztechnisches Verhalten von Bauteilen - Bestimmung des Widerstandes des Außenwandsystems gegen Schlagregen bei pulsierendem Luftdruck

This European Standard was approved by CEN on 29 December 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 89 "Thermal performance of buildings and building components", the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This standard is one of a series of standards which specify test methods for the thermal and moisture related properties of buildings, building components, building products and building materials.

Annex A is informative.

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Introduction

Driving rain is often the cause of building damage due to the penetration of wind driven rain into or through external wall elements. The amount of driving rain impinging on a local part of an external wall surface depends on the rainfall and wind speed occurring simultaneously, the exposure of the building and the architectural / structural details of the surface. National standards define areas with different classes of driving rain severity which may be used to determine the protection needed against driving rain.

Protection can be achieved by measures such as:

- a) architectural / structural design to reduce the amount of driving rain (e.g. roof overhangs);
- b) ventilated or unventilated air space behind cladding (any water penetrating the cladding flows down on the internal face of the cladding and is drained out at specified openings; an air flow in a ventilated air space due to stack effects accelerates the drying);
- c) rendering on external wall surfaces with appropriate properties to absorb or repel the water during driving rain and allow drying during the following drying period;
- d) proper detailing to prevent water ingress around openings;
- e) providing a defined water tightness of the wall element including existing joints so as to limit water penetration to an acceptable level.

This standard specifies a test method to determine the resistance of wall elements to driving rain, thus mainly covering measure e).

The specified test conditions, with pulsating air pressure difference, simulate in a simplified way the dynamic nature of rain and wind pressure against a wall.

Test methods for the determination of the resistance to driving rain under static air pressure may lead to different results.

This standard is intended to be used by product specifications, except where specific products have properties which make application of this standard difficult.

1 Scope

This standard specifies a general method for assessing the driving rain resistance of wall systems by determining the water tightness of wall systems or part of wall systems under pulsating air pressure.

2 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

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2.1 driving rain resistance **(standards.iteh.ai)**

ability of the test specimen to resist water penetration under the conditions of the test

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2.2 water penetration

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water continuously or repeatedly reaching the inside surface of the test specimen or parts of the specimen not designed to be wetted or where the water is not drained out

2.3 pulsating air pressure difference

air pressure difference across the specimen alternating periodically between zero and a specified higher level

2.4 limit of water tightness

maximum pulsating air pressure difference, in Pa, for which water penetration does not occur during the test

2.5 water absorption

mass of absorbed water per area, in kg/m²

3 Principle

A test specimen is fitted into the driving rain test apparatus, the external surface of the test specimen is sprayed continuously with water at a specified rate while the pulsating air pressure difference is increased in specified steps. The time of water penetration, if any, the maximum air pressure difference applied and the location of any penetrations are noted.

4 Apparatus

The driving rain test apparatus shall include:

- a) chamber with an adjustable opening to which the test specimen is fitted;
- b) means of providing a controlled differential air pressure across the test specimen with a control uncertainty of $\pm 5\%$;

NOTE 1 The control should be able to keep the pulsating pressure difference within the above mentioned accuracy even when the air permeability varies during the test due to the water film on the surface and the water absorbed by the test specimen.

- c) device able to apply rapid controlled changes of the differential air pressure operating between defined limits (see clause 6.2 and Figure 1 for the sequence of a typical pressure pulse);
- d) spraying system applying a continuous film of water all over the surface of the test specimen;

The applied amount of water consists of two parts:

- run-off water, 1,2 l/(m·min), evenly distributed at the top of the test specimen;
- driving rain, 1,5 l/(m²·min), evenly distributed over the external surface of the test specimen.

NOTE 2 A spraying device, usually calibrated in litres per minute, which complies with this requirement is shown in annex A.

The distribution of driving rain can be controlled using driving rain gauges mounted on a panel. The height and width of the gauges shall not exceed 200 mm. The deviation from nominal values shall not exceed 0,3 l/(m·min) for run off water and 0,5 l/(m²·min) for driving rain.

- e) devices to measure the amount of supplied water to an accuracy of $\pm 10\%$;
- f) means of measuring the differential air pressure between the two faces of the test specimen to an accuracy of $\pm 5\%$;
- g) a supply of water which is clean enough to ensure that all nozzles spray correctly;

NOTE 3 It may be necessary to use demineralized or deionised water to prevent clogging of nozzles.

- h) scale or any weighing device able to determine the mass of the test specimen to an accuracy of at least $\pm 0,1$ %.

5 Test specimens

5.1 Dimensions of the test specimen

The dimensions of the test specimen shall be as specified by the relevant product specification. In the absence of such a specification, the dimensions of the test specimens shall be as large as necessary to be representative of the intended use, but not less than:

width	1200 mm
height	2400 mm

The joints of modules in the test specimen shall be representative, e.g. the same length per square metre as in reality.

5.2 Number of test specimens

The number of test specimens shall be as required by the relevant product specification or, in its absence, as agreed between the parties.

NOTE Normally one test specimen is sufficient.

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5.3 Preparation of the test specimen

The test specimen shall be representative of the intended use and constructed according to the client's specification. The test specimen may be built in a frame, which does not absorb water, to facilitate transport and fitting to the opening of the driving rain test apparatus. The joint between test specimen and frame shall be sealed, but in a way not preventing the free drainage of water.

If a frame is used, it shall be sufficient to withstand the pressures applied during the test without deflecting to an extent to influence the test results. The frame shall be prepared and installed so that any water penetration shall be readily detectable.

The test specimen shall be fixed plumb, level, square and without visible twists or bends induced by the fixing.

5.4 Conditioning of the test specimen

Conditioning, including drying, curing etc. of the specimen shall be according to the relevant product specification or, in its absence, as agreed between the parties.

6 Procedure

6.1 Test conditions

The test shall be carried out at a temperature of (23 ± 5) °C.

6.2 Test procedure

Fit the test specimen to the opening of the apparatus. Spray water on the specimen at the specified rate and, after an initial period with no pressure difference, apply the pulsating air pressure difference steps and the time intervals according to Table 1. Each pressure pulse consists of four stages: a rising pressure stage of (3 ± 1) s, a maximum pressure stage of (5 ± 1) s, a falling pressure stage of (2 ± 1) s and a zero pressure stage of (5 ± 1) s. The total duration of a pulse shall be (15 ± 2) s. The test procedure is shown also graphically in Figure 1. Two test procedures are defined, procedure A for qualitative short time testing and procedure B for quantitative testing where water absorbed by the test specimen or penetrating the test specimen during the test has to be determined.

Table 1 - Test procedures

	Procedure A		Procedure B	
Pressure difference Pa	Time interval min	Total time at end of steps min	Time interval min	Total time at end of steps min
0	20	20	60	60
0 to 150	10	30	60	120
0 to 300	10	40	60	180
0 to 450	10	50	60	240
0 to 600	10	60	60	300
$600 + i \cdot 150$ $i = 1, 2, 3, \dots, n$	10	$60 + i \cdot 10$	60	$300 + i \cdot 60$

Record the temperature of the spraying water before and after the test, the air temperature and the relative humidity of the laboratory during the test.

Observe the surface of the test specimen and note the time, the maximum air pressure difference when water penetration occurs and the location of the penetration areas.

Stop the test when water penetration occurs. Note the limit of water tightness in Pascals.

If required the water absorbed by the test specimen during the test shall be determined by weighing the test specimen before and after the exposure to driving rain. The mass of the test specimen after the test shall be determined after the test specimen has "drained" for a period of (10 ± 2) min at normal laboratory conditions.