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SVENSK STANDARD SS-EN 12114

Handläggande organ	Fastställd	Utgåva	Sida
Byggstandardiseringen, BST	2000-07-28	1	1 (1+12)

Byggnaders termiska egenskaper – Luftgenomsläpplighet hos byggkomponenter och byggnadsdelar – Laboratorieprovning

Thermal performance of buildings – Air permeability of building components and building elements – Laboratory test method

Europastandarden EN 12114:2000 gäller som svensk standard. Detta dokument innehåller den engelska språkversion av EN 12114:2000.

EN 12114 har tagits fram inom CEN/TC 89, Thermal performance of buildings and building components.

I standarden beskrivs utrustning och metod för att bestämma luftgenomsläpplighet hos byggkomponenter och byggnadsdelar. Metoden är utvecklad för att simulera funktionen under verkliga förhållanden. Provningen görs så att byggnadsdelen utsätts för en serie tryckskillnader och samtidigt bestäms luftflödet genom byggnadsdelen vid varje tryckskillnad. Mätresultaten används för att bestämma koefficienterna C och n i ekvationen:

$$\text{luftflöde} = C \cdot (\text{tryckskillnad})^n$$

Motsvarigheten och aktualiteten i svensk standard till de publikationer som omnämns i denna standard framgår av ”Katalog över svensk standard”, som årligen ges ut av SIS. I katalogen redovisas internationella och europeiska standarder som fastställts som svenska standarder och övriga gällande svenska standarder.

ICS 91.060.10

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English version

Thermal performance of buildings - Air permeability of building components and building elements - Laboratory test method

Performance thermique de bâtiments - Perméabilité à l'air des composants et parois de bâtiments - Méthode d'essai en laboratoire

Wärmetechnisches Verhalten von Gebäuden - Luftdurchlässigkeit von Bauteilen - Laborprüfverfahren

This European Standard was approved by CEN on 20 May 1999.

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 Central Secretariat 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 Central Secretariat 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.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 12114:2000 E

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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 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

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.

Introduction

Air permeability is an important performance characteristic for many types of building envelopes. The general test method given in this standard sets out the main features (definitions, apparatus, test procedure, expression of results) for the laboratory testing of air permeability of building components and parts of building envelopes. Annex A (normative) gives test conditions (which may depend on the type and use of the tested products), to be followed unless product specifications specify otherwise.

Except where specific products have properties which make application of this standard difficult, this standard should be used as the reference by all harmonised product specifications.

1 Scope

This standard defines a general laboratory test method for determining the air permeability of building components or building elements, when subjected to positive or negative air pressure differences. It specifies the definitions, the test equipment and procedure, and provides directions for the interpretation of results.

Annexes give indications on test conditions and a method for expressing results using a regression technique.

This standard is not applicable to whole buildings or on site measurements.

2 Normative references

No other European or International Standards are referred to.

3 Definitions, symbols and units

3.1 Definitions

For the purposes of this standard, the following definitions apply:

3.1.1 pressure difference: Difference in static pressure across a specimen.

NOTE: The pressure difference is positive if the pressure on the external face is higher than the pressure on the internal face. It is negative if the pressure on the external face is lower than the pressure on the internal face.

3.1.2 air flow rate: Volume of air transferred to or from a system divided by time.

3.1.3 air permeability: Air flow rate, at reference conditions, as a function of the pressure difference.

3.1.4 leakage coefficients: Flow coefficient, *C*, and flow exponent, *n*, in the empirical leakage equation:

$$\dot{V} = C\,\Delta p^{n} \qquad (1)$$

where Δp is the pressure difference.

3.1.5 flow coefficient: Air flow rate through the test specimen at a pressure difference of 1 Pa.

3.1.6 equivalent leakage area: Area of an ideal orifice having a discharge coefficient equal to 1 and the same leakage flow rate as the measured element at a conventional pressure difference.

3.1.7 overall area: Area calculated from the overall dimensions of the test specimen.

3.1.8 discharge coefficient: Ratio of air flow rate through an orifice to a theoretical air flow rate through the same orifice obtained with laminar flow of an incompressible fluid without viscosity.

3.1.9 reference conditions: Conventional air temperature, relative humidity and atmospheric pressure for calculation of air permeability.

3.2 Symbols and units

Symbol	Name of quantity	Unit
A	overall area	m^2
A_L	equivalent leakage area	m^2
C	flow coefficient	$m^3/(s \cdot Pa^n)$
T	thermodynamic temperature of air flow	K
T_0	reference temperature	K
$\dot{V}$	air flow rate	m^3/s, m^3/h
n	flow exponent	-
p	pressure	Pa
p_a	barometric pressure	Pa
p_0	reference barometric pressure	Pa
p_w	water vapour pressure	Pa
Δp	pressure difference	Pa
ϕ	relative humidity of air	-
ρ	density of air	kg/m^3
Subscripts		
L	leakage	
a	air, atmosphere	
w	water	
0	reference conditions (101325 Pa, 20 °C, 50 % RH)	

4 Principle

A set of pressure difference steps (positive and/or negative) is applied across the specimen and the air flow rate through the specimen is measured at each step. The measurement results are corrected to reference conditions. A graph of air flow rate versus pressure difference is drawn. When appropriate, the leakage coefficients characterising the building component are derived from the measured results.

5 Apparatus

The test apparatus shall include the following (see figure 1):

a) a rig into which the test specimen can be fitted;

b) means of applying a controlled air pressure difference over the test specimen;

c) means of producing rapid changes of air pressure differences, controlled within defined limits;

d) an apparatus for measuring the air flow rate to an accuracy of ± 5 %, calibrated at reference conditions (20 °C, 101 325 Pa and 50 % RH);

e) a means for measuring the applied air pressure difference with an accuracy of ± 5 %.

f) means of sealing all joints of the test specimen (either with an adhesive tape or with an airtight sheet covering the whole of the test specimen).

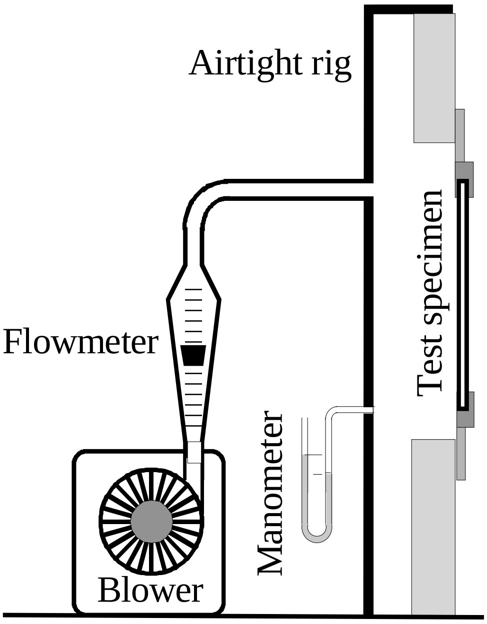

Figure 1: Example of apparatus

The air permeability of the test rig shall be determined at least once a year or whenever a test rig is disassembled, by replacing the test specimen by an airtight panel and by following the procedure described in clause 7 up to the maximum possible pressure difference and both for positive and negative pressure differences. The residual air flow rates shall be recorded for each pressure difference.

6 Preparation of test specimen

The test specimen shall be representative of the tested component. If the test specimen includes joints or other potential air leakage paths, ensure that their length or area are representative of conditions in use.

A surround for the test specimen shall be provided. It shall be able to withstand the pressures applied during the test without deflecting to an extent likely to influence the test results.

The test specimen shall be fixed plumb, level, square and without visible twists or bends induced by the fixings. Any transport blocks, bracings, packing or protective wrapping shall be removed. The test specimen shall be cleaned and surfaces dry. Any ventilation opening or device shall be either sealed, closed or left open, according to the purpose of the test.

7 Test procedure

7.1 Preliminaries

Measure the air temperature in the apparatus to an accuracy of ± 2 K, the barometric pressure to an accuracy of ± 1 kPa and relative humidity to an accuracy of ± 10 %. Ensure that these quantities remains constant within the ranges mentioned during the whole test.

The ambient temperature and humidity in the apparatus shall be within the range 15 °C to 30 °C and 25 % to 75 % RH. The specimen shall be conditioned at these ambient conditions before the test, for a time period sufficient to obtain thermal and moisture equilibrium within the specimen

Select the maximum pressure difference, Δp_{max}, according to the related product specification. When not available, use annex A.

7.2 Procedure

The test is performed with positive pressure differences and, if required, also with negative pressure differences.

The procedure is dependent on the air-tightness of the test rig itself. A test rig is considered airtight if its residual air flow rate is less than 5 % of the smallest flow rate to be measured.

NOTE: For non-airtight test rigs, it is advisable to measure the residual air flow rates for negative pressure differences immediately after measuring the residual air flow rates for positive pressure differences.

7.2.1 Measurement of air permeability of specimen fitted in an airtight test rig

Three pressure pulses shall be applied. The duration of increase in pressure shall not be less than one second. Each pulse shall be maintained for at least three seconds. Each pulse shall produce a pressure difference 10 % to 12 % greater than the maximum pressure difference Δp_{max} for the test. Figure A.1 shows the variation of pressure differences with time.

Air pressure differences shall then be applied in several steps according to the related product specification. When not available, use annex A. The smallest pressure differential shall be such that it can be measured with a relative accuracy of 5 %.

The air flow rate and static pressure difference are measured and recorded at each step. The duration of each step shall be such that the air pressure in the test rig is stabilised before the air flow rate is measured.

7.2.2 Measurement of air permeability of specimen fitted in a non-airtight test rig

7.2.2.1 Residual air flow rate measurements

All joints of the test specimen shall be sealed, either with an adhesive tape or with an airtight sheet covering the whole of the test specimen.

The three pressure pulses as defined in 7.2.1 shall be applied on the sealed test specimen.

Measure and record the residual air flow rates according to 7.2.1.

7.2.2.2 Global air permeability measurement

The test specimen shall be unsealed.

Then the three pressure pulses as defined in 7.2.1 shall be applied.

Measure and record the global air flow rates according to 7.2.1.