SLOVENSKI STANDARD
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Obešene fasade - Prepustnost zraka - Zahteve in klasifikacija

Curtain walling - Air permeability - Performance requirements and classification

Vorhangfassaden - Luftdurchlässigkeit - Leistungsanforderungen und Klassifizierung

Façades rideaux - Perméabilité à l'air - Exigences de performance et classification

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91.060.10	Stene. Predelne stene. Fasade	Walls. Partitions. Facades

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English Version

Curtain walling - Air permeability - Performance requirements and classification

Façades rideaux - Perméabilité à l'air - Exigences de performance et classification

Vorhangfassaden - Luftdurchlässigkeit - Leistungsanforderungen und Klassifizierung

This European Standard was approved by CEN on 5 June 2023.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (EN 12152:2023) has been prepared by Technical Committee CEN/TC 33 “Doors, windows, shutters, building hardware and curtain walling”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by January 2024, and conflicting national standards shall be withdrawn at the latest by January 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12152:2002.

The main changes compared to the previous edition are listed below:

— modified the class "AE": added the declaration of the maximum test pressure;

— added a new classification of air permeability at negative pressure;

— added new symbols for the classification based on fixed joint length;

— editorial modifications to definitions, in order to make them compliant with the definitions of EN 12153.

This document is part of a series of European Standards dedicated to curtain walling products and derives from performance requirements.

This document forms part of a series of curtain walling standards as specified in the Product Standard EN 13830.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

1 Scope

This document specifies requirements and classification of air permeability of both fixed and openable parts of curtain walling, under positive and negative static air pressure.

This document applies to curtain walling as specified in EN 13830.

NOTE This version EN 12152:2023 supersedes EN 12152:2002. Existing test results according to EN 12152:2002 could be considered still valid compared with this version of EN 12152.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 12153, *Curtain walling - Air permeability - Test method*

EN 12207, *Windows and doors - Air permeability - Classification*

EN 13119, *Curtain walling - Terminology*

EN 13830, *Curtain walling - Product standard*

EN 1991-1-4, *Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13119 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
test pressure
differential air pressure between the two faces of the test specimen, expressed in pascal (Pa)

3.2
positive pressure
when the outer face is subjected to higher air pressure than the inner face

3.3
negative pressure
when the outer face is subjected to lower air pressure than the inner face

3.4
air permeability
passage of air through the construction of the curtain walling when subjected to air pressure

Note 1 to entry: The volume being expressed as a rate in cubic metres per hour (m^3 / h), this rate being related to the overall area of the curtain walling. Alternatively, the rate can be related to the metre length of joint.

3.5
fixed joint
all joints except those between openable parts of the curtain wall (see Figure 3)

3.6
fixed joint length
sum of the length of all fixed joints within the curtain walling measured along the line of the air seal/barrier

Note 1 to entry: Where a window is included within the curtain walling, the length of the perimeter joint shall be included in the calculation (see Figure 3).

3.7
openable joint
perimeters of all moving casement or sash, in accordance with EN 12207

3.8
overall area
sum of the areas of all the faces measured parallel to all fixed and openable panels (see Figure 2)

Note 1 to entry: It shall be expressed in m^2.

Note 2 to entry: Profiles for mounting the specimen in the test rig shall not be considered.

4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

P_n	intermediate test pressures [Pa]
Q_n	permissible air permeability at intermediate positive and negative tests pressure P_n [m^3/m^2 x h] or [m^3/m x h]
P_o	maximum positive and negative tests pressure [Pa]
Q_o	permissible air permeability at maximum positive and negative tests test pressure P_o [m^3/m^2 x h] or [m^3/m x h]
P_{max}	maximum positive and negative pressure [Pa]

5 Requirements

The air permeability for the fixed areas of the curtain walling shall take no account of the passage of air through openable joints and shall be related both to the positive and negative pressures applied and the overall area, or the fixed joint lengths, of the test specimen.

The air permeability per m^2 allowed for classification purposes is related to the test pressures according to negative and positive pressures as shown in Table 1, and the air permeability per metre length of joint is related to positive and negative tests pressures as shown in Table 2.

Air permeability performance requirements of a curtain wall shall be established from Table 1 or Table 2 which are derived from positive and negative tests pressures equating to 0,25 of the design wind load as determined in EN 1991-1-4.

For intermediate test pressures (P_n) the air permeability allowed (Q_n) shall be determined using Formula (1):

$$Q_n = Q_o \left[\frac{P_n}{P_0} \right]^{2/3} \quad (1)$$

where

Q_n is the permissible air permeability at intermediate positive or negative tests pressure P_n;

Q_o is the permissible air permeability at maximum positive or negative tests pressure P_o.

NOTE Where elevation layouts incorporate a large number of smaller pane units with associated mullions and transoms, it can be beneficial to express air permeability in terms of metre length of fixed joint, in lieu of m^2 of curtain wall area. In such conditions Table 2 could be applied, based on 0,5 m^3 per metre per hour ($m^3/m \cdot h$).

The air permeability for openable parts of curtain walling (e.g. windows within curtain walling facade) shall be related to EN 12207.

6 Test methods

The test specimen shall be tested in accordance with EN 12153.

Two air permeability tests shall be carried out: one with positive test pressures and one with negative test pressures.

The test sequence as specified in EN 13830 shall be followed.

7 Classification

Five classes are specified in order to adequately cover all location and regional conditions likely to be experienced (see Figure 1 and Table 1, or alternatively Table 2). Each class is related to the test pressures according to negative or positive pressures, resulting in two classes: one class for positive pressure and one class for negative pressure.

For the relevant class, the air permeability at the maximum test pressure indicated in Table 1 or Table 2, and the air permeability at the intermediate test pressures specified in EN 12153 and calculated in accordance with Clause 5, shall not exceed that allowed, through the entire range of specified test pressure steps.

The test report shall refer to both negative and positive pressure tests.

For classification purposes, the test result is defined as the air permeability results both at negative and positive pressures (expressed in absolute value as $m^3/m^2 \cdot h$ or $m^3/m \cdot h$) at each pressure steps.

According to the results of the tests, the fixed element curtain walling product can be classified as indicated in Table 1, or alternatively in Table 2, and by reference to Figure 1.

Table 1 — Air permeability classes (A) at positive or negative pressures, based on overall area

Maximum pressure P_{max} (Pa)		Air permeability results at negative or positive pressures ($m^3/m^2 \cdot h$)	Class	
Positive pressure	Negative pressure		Positive pressure	Negative pressure
+ 150	- 150	1,5	A1(+)	A1(-)
+ 300	- 300	1,5	A2(+)	A2(-)
+ 450	- 450	1,5	A3(+)	A3(-)
+ 600	- 600	1,5	A4(+)	A4(-)
> + 600	< - 600	1,5	AE(+xxx)	AE(-xxx)

Specimens which leak air > 1,5 $m^3/m^2 \cdot h$ at pressures < +150 Pa or > –150 Pa (e.g. -100 Pa) cannot be classified.

Specimens which leak air < 1,5 $m^3/m^2 \cdot h$ at pressures > +600 Pa or < –600 Pa (e.g. -750 Pa) are classified E (Exceptional) (see Figure 1).

Where P_{max} is > +600 Pa or < - 600 Pa (e.g. -750 Pa), the final test pressure shall be quoted in the test report and the final pressure shall be indicated as a suffix to the classification, i.e. AE+750, AE+900, etc.

Table 2 — Air permeability classes (A_L) at positive or negative pressures, based on fixed joint length

Maximum pressure P_{max} (Pa)		Air permeability results at negative or positive pressures ($m^3/m \cdot h$)	Class [a]	
Positive pressure	Negative pressure		Positive pressure	Negative pressure
+ 150	- 150	0,5	A_L1(+)	A_L1(-)
+ 300	- 300	0,5	A_L2(+)	A_L2(-)
+ 450	- 450	0,5	A_L3(+)	A_L3(-)
+ 600	- 600	0,5	A_L4(+)	A_L4(-)
> + 600	< - 600	0,5	A_LE(+xxx)	A_LE(-xxx)

[a] Class A_L shall be read as "A" in accordance with classification given in EN 12152:2002.

Specimens which leak air > 0,5 $m^3/m \cdot h$ at pressures < +150 Pa or > –150 Pa (e.g. -100 Pa) cannot be classified.

Specimens which leak air < 0,5 $m^3/m \cdot h$ at pressures > +600 Pa or < –600 Pa (e.g. -750 Pa) are classified E (Exceptional) (see Figure 1).

Where P_{max} is > +600 Pa or < - 600 Pa (e.g. -750 Pa), the final test pressure shall be quoted in the test report and the final pressure shall be indicated as a suffix to the classification. i.e. AE+750, AE+900, etc.

In case classes are different for ($m^3/m^2 \cdot h$) and ($m^3/m \cdot h$), classification shall be expressed for both of them (see the example in Table 3).

Table 3 — Example: expression of air permeability classes at positive and negative pressures, when the classes based on overall area and on fixed joint length are different

Air permeability results at negative or positive pressures		P_{max}	Class
Positive pressure test	Results based on fixed joint length ($m^3/m \cdot h$)	+450 Pa	Class A_L3 (+)
	Results based on overall area ($m^3/m^2 \cdot h$)	+ 600 Pa	Class A4 (+)
Negative pressure test	Results based on fixed joint length ($m^3/m \cdot h$)	- 300 Pa	Class A_L2 (-)
	Results based on overall area ($m^3/m^2 \cdot h$)	- 450 Pa	Class A3 (-)