BRITISH STANDARD

BS EN
12153:2000

Curtain walling — Air permeability — Test method

The European Standard EN 12153:2000 has the status of a British Standard

ICS 91.060.10

National foreword

This British Standard is the official English language version of EN 12153:2000.

The UK participation in its preparation was entrusted by Technical Committee B/538, Doors, windows, shutters, hardware and curtain walling, to Subcommittee B/538/6, Curtain walling, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 13 and a back cover.

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English version

Curtain walling - Air permeability - Test method

Façades rideaux - Perméabilité à l'air - Méthode d'essai

Vorhangfassaden - Luftdurchlässigkeit - Prüfverfahren

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

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

Ref. No. EN 12153:2000 E

Contents

Foreword

This European Standard 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of an identical text or by endorsement, at the latest by December 2000, and conflicting national standards shall be withdrawn at the latest by December 2000.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.

This standard contains a bibliography which provides for the inclusion of additional information in the expression of the test results.

This European Standard is part of a series of European Standards dedicated to curtain walling products.

This European Standard also forms part of a series of curtain walling performance requirements as defined in the product standard prEN 13830:2000.

1 Scope

This standard defines the method to be used to determine the air permeability of curtain walling, both its fixed and openable parts. It describes how the specimen shall be tested under positive and negative air pressure.

NOTE: This standard applies to any curtain walling product as defined in prEN 13830:2000.

2 Normative References

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate points in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these listed publications apply to this European Standard only when incorporated into it by amendment or revision. For undated references the latest edition of the publication referred to applies.

prEN 12152:1999	Curtain walling - Air permeability - Performance requirements and classification.
prEN 13119:1997	Curtain walling - Terminology.

3 Definitions

For the purposes of this standard, the definitions given in prEN 13119:1997, together with the following, apply.

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

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

3.3
negative pressure
when inner face is subjected to higher pressure than outer face

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

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

Where a window is incorporated in the specimen, it shall be considered as a panel for the purpose of the fixed joint calculation.

3.6
fixed joint length
sum of the perimeters of all fixed and openable panels (windows) within the specimen, having regard to the position of the principle air barrier

3.7
openable joint length
sum of the perimeters of all moving frames within the test specimen

3.8
overall area
sum of the areas of all the faces of the specimen that are enclosed within the test chamber, measured parallel to all fixed and openable panels (see Figure 2)

It shall be expressed in square metres (m^2).

4 Principle

Application of increasing and decreasing pressure steps (positive or negative) with measurements of air flow at each test pressure.

5 Apparatus

5.1 A chamber with an opening into which the test specimen can be fitted. This chamber shall be of sufficient strength and rigidity to withstand the test pressures likely to be imposed during the tests. It shall not deflect under test pressure to any extent which would affect the performance of the test specimen (see Figure 1).

Adequately representative structural supports shall be provided to which the specimen shall be attached in accordance with the conditions of use in the works (see also clause 6).

The chamber shall be constructed so that the air permeability through it, at pressures up to the maximum test pressure, does not exceed the permissible air permeability through the specimen at the same pressure.

5.2 A means for applying controlled positive (or negative) test pressures to the test specimen.

5.3 A means by which rapidly controlled changes of positive (or negative) test pressures may be produced within defined limits.

5.4 A means of measuring the air flow into the chamber within an accuracy of ±5 % in order to enable the quantity of air permeability through the specimen to be assessed within an accuracy of 10 % of the permissible air permeability through the specimen.

5.5 A means of measuring the positive (or negative) test pressures, steady or fluctuating, calibrated within an accuracy of ±5 %.

5.6 A temporary means of sealing all joints of the specimen during the determination of test chamber leakages.

6 Test specimen

The specimen shall be submitted in a fully operable condition, ready for use. It shall be supplied in a suitable manner for fixing onto a test chamber. The test specimen shall not be less than two typical units wide and shall be sufficient to provide full loading on at least one typical vertical joint or framing member or both. The specimen shall not obtain additional stiffness from the test chamber. The height shall not be less than the full distance between the curtain wall's point of connection to the building structure.

For custom designed curtain walls or special elements, the specimen shall be a size which is adequate to demonstrate its compliance with the specified requirements.

All parts of the specimen shall be full size, using the same materials, details, methods of construction and fixing as intended for use in the works. Conditions for connection to the structural support shall simulate those in the works as accurately as possible (see also 5.1).

This standard does not apply to the perimeter joints between the curtain walling and the test chamber, or to the joints between the curtain walling and the building construction.

7 Test preparation

Build the test specimen into the test chamber.

Fix true to the normal attitude of use in both directions, level, square and without visible twist or bend as a result of the application of fixing devices.

Remove all transport blocks, bracings or packings and protective wrappings.

Tape all openable joints to prevent air infiltration.

Tape seal any ventilation devices, where these may occur.

Ensure any leakage through all points, including frame joints, is readily detectable.

Ensure all joints between the test specimen and the test chamber are sealed.

Ensure the specimen is clean prior to commencing the test sequence.

8 Test procedure

For classification, select the maximum test pressure (P_{max}) according to prEN 12152:1999.

Apply test pressures, throughout the following procedures, in increments of 50 Pa up to 300 Pa and increments of 150 Pa up to the maximum test pressure (Figure 3).

Determine the air permeability (Q_c) of the test chamber only, excluding the effect of the test specimen.

NOTE: If this is already known from previous tests, 8.1 is carried out.

Seal the specimen airtight to isolate it from the test chamber.

Apply 3 pulses of positive pressure equal to 500 Pa or 10 % greater than the maximum test pressure (P_{max}), whichever is greater. The maximum pressure for each pulse should be reached in not less than 1 s and it should be maintained for not less than 3 s.

Apply test pressures, for not less than 10 s each, in the same sequence as will be used on the test specimen and measure the airflow into the test chamber at each test pressure.

When the specimen is to be tested under negative test pressures, measure the air permeability of the test chamber, as above, under the appropriate negative test pressures.

Remove the airtight seal from the test specimen.

Ensure all openable joints are sealed with tape to make them airtight.

8.1 Positive pressure test: Fixed elements

Apply 3 pulses of positive pressure equal to 500 Pa or 10 % greater than the maximum test pressure (P_{max}), whichever is greater. The maximum pressure for each pulse should be reached in not less than 1 s and it should be maintained for not less than 3 s.

Apply positive test pressures, for not less than 10 s each, in the appropriate sequence up to the selected maximum test pressure (P_{max}) and measure the airflow (Q_{fc}) into the test chamber at each test pressure.

8.2 Negative pressure test: Fixed elements

Perform this test only when specifically required.

Repeat the entire procedure according to 8.1 using negative test pressure.

8.3 Pressure test: Total specimen

Remove tape from openable joints.

Open and close all openable windows 5 times and finally secure them in the closed position.

Proceed as in 8.1 (and 8.2 if required) and measure the airflow (Q_{tc}) into the test chamber at each test pressure.

8.4 Expression of results

Determine the air permeability (Q_f) for the fixed panels and (Q_j) for the openable joints, at each test pressure in cubic meters per hour (m^3/h) as follows:

For fixed panels $Q_f = Q_{fc} - Q_c$

For openable panels $Q_j = Q_{tc} - Q_{fc}$

where:

Q_c airflow into the test chamber, measured with the specimen sealed airtight

Q_{fc} airflow into the test chamber, measured with only the openable joints sealed

Q_{tc} airflow into the test chamber, measured with the openable joints unsealed

Determine the overall area (A) of the test specimen and the total length (L_o) of openable joints.

Calculate the air permeability per unit area of fixed panels (Q_t / A) in m^3/m^2h at each test pressure and plot a graph of the results against the test pressures.

Calculate:

- the air permeability per unit length of openable joint (Q_j / L_o) in $m^3/h{\cdot}m$ at each test pressure and plot a graph of the results against the test pressures.

Alternatively,

- the air permeability per unit length of fixed joint (Q_f / L_f) in cubic metres per hour per metre ($m^3/h{\cdot}m$) at each test pressure and plot a graph of the results against the test pressures.

8.5 Test report

Prepare a report to positively identify the specimen/s and record all parameters checked.

The report shall include the following details:

-reference to this standard;

-the name of the testing institute;

-persons or persons requesting the test;

-details of test specimen/s as follows:

- type/s of construction;
- profile references;
- origin of materials;
- type/s of materials;
- date/s of manufacture, (if known);

- dimensioned drawings of specimen/s;

- the results of the test;

- product designation from manufacturer’s literature;
- observations as to the condition of the specimen/s;
- date of test;
- date of calibration of test chamber and equipment;
- date of report;
- signature of person preparing the report.

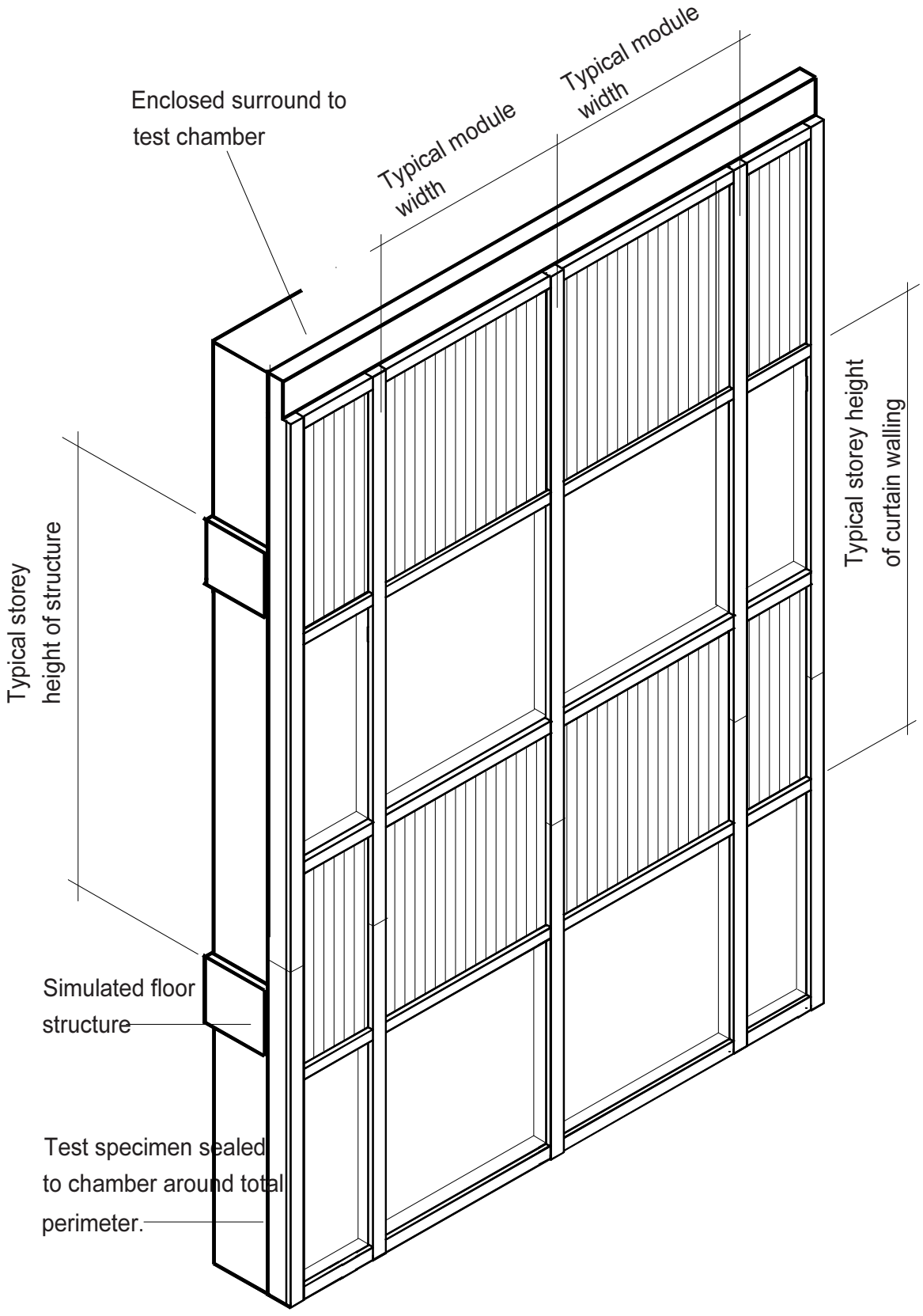
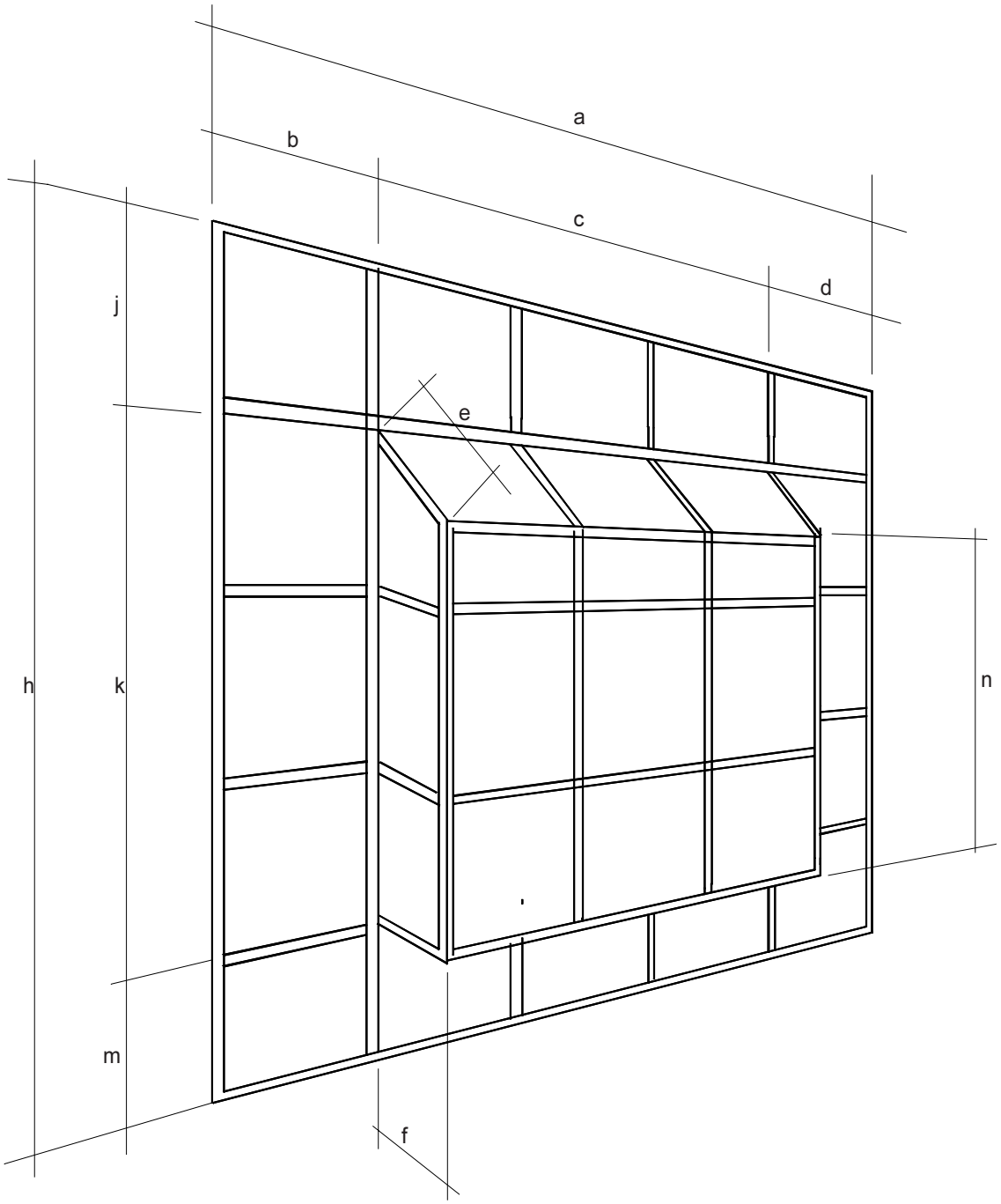


Figure 1 - Example of test specimen built onto test chamber



Total area = $(a \times j) + (a \times m) + (b \times k) + (d \times k) + (c \times n) + (c \times e) + (c \times f) + 2(f \times n) + [(k - n) \times f]$

Figure 2 - Example of calculation of overall area

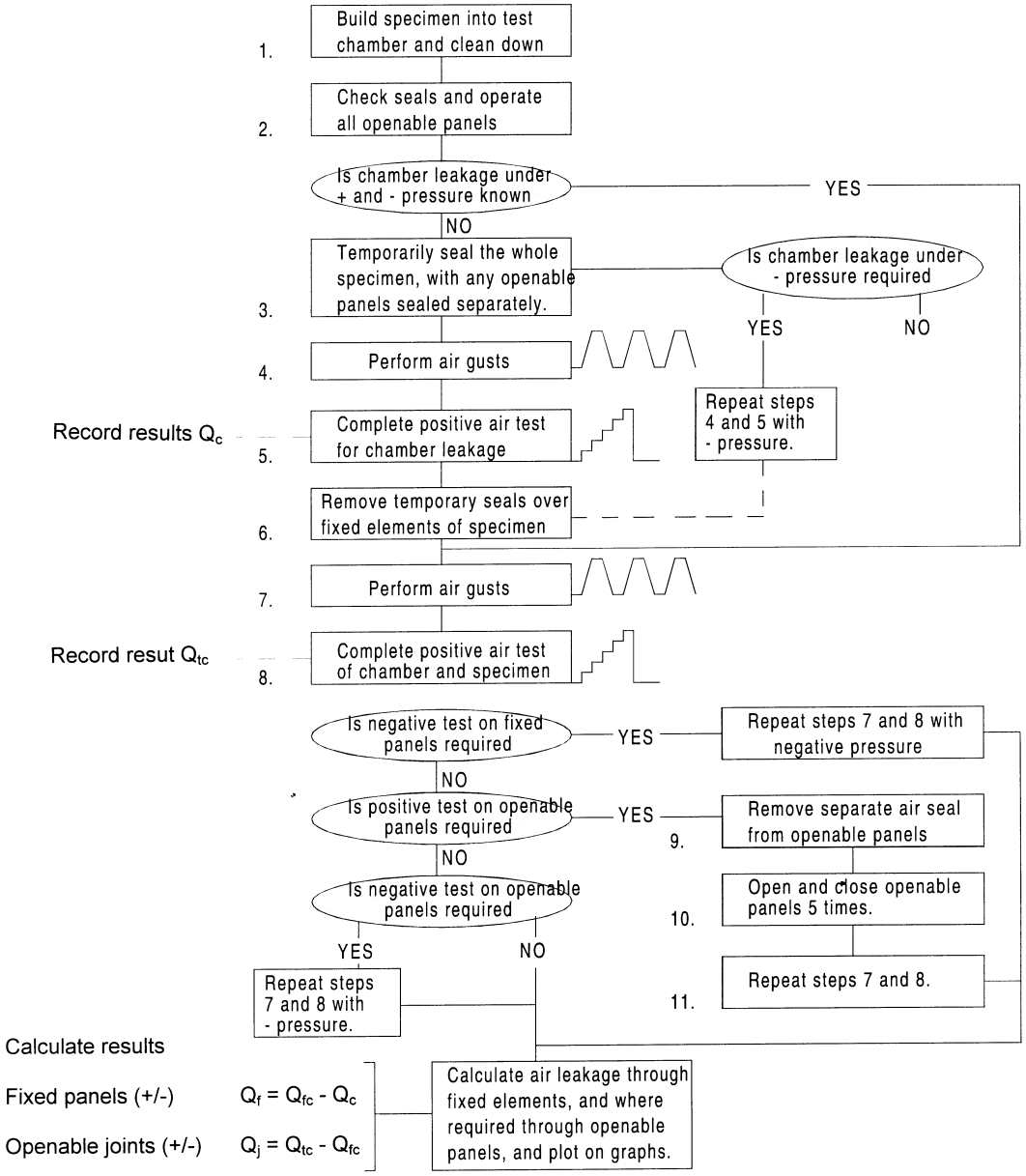


Figure 3 - Flow chart of test procedure

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EN 12207:1999 Windows and doors - Air permeability - Classification.

prEN 13830:2000 Curtain walling - Product standard.

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