



BSI Standards Publication

Rigid cellular plastics — Determination of water vapour transmission properties

National foreword

This British Standard is the UK implementation of [ISO 1663:2023](#).

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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Rigid cellular plastics — Determination of water vapour transmission properties

*Plastiques alvéolaires rigides — Détermination des propriétés de
transmission de la vapeur d'eau*



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 10, *Cellular plastics*.

This fourth edition cancels and replaces the third edition (ISO 1663:2007), which has been technically revised.

The main changes are as follows:

- in the Scope ([Clause 1](#)):
 - the unit ng has been changed to µg;
 - the upper limit has been changed from 200 µg/(m²·s) to 1 400 µg/(m²·s);
- [Clause 9](#) has been modified as follows:
 - [9.2](#), "Blank specimen" has been added;
 - [9.3.2](#) "Corrections" has been added;
 - in [9.5](#), [Formula \(8\)](#) has been modified;
- in [Clause 11](#), a new item (k) has been added;
- [Formula \(B.8\)](#) has been modified.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Rigid cellular plastics — Determination of water vapour transmission properties

1 Scope

This document specifies a method of determining the water vapour transmission rate, water vapour permeance, water vapour permeability and water vapour diffusion resistance index for rigid cellular plastics.

This method is applicable for the testing of rigid cellular materials that have thicknesses from 10 mm upwards and can, as an integral part of the material, contain natural skins or adhered facings of some different material.

Three different sets of temperature and humidity conditions are provided, as follows:

- a) 38 °C and a relative-humidity gradient across the test specimen of 0 % to 88 %
- b) 23 °C and a relative-humidity gradient across the test specimen of 0 % to 85 %
- c) 23 °C and a relative-humidity gradient across the test specimen of 0 % to 50 %

The results obtained by this method are suitable for design purposes and production control, and for inclusion in product specifications.

The method is suitable for materials which have water vapour transmission rates in the range 3 µg/(m²·s) to 1 400 µg/(m²·s).

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.

[ISO 291](#), *Plastics — Standard atmospheres for conditioning and testing*

[ISO 1923](#), *Cellular plastics and rubbers — Determination of linear dimensions*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

water vapour transmission rate

quantity of water vapour transmitted through unit area of a test specimen in unit time under specified conditions of temperature, humidity, and thickness

Note 1 to entry: It is expressed in micrograms per square metre per second (µg·m⁻²·s⁻¹).

Note 2 to entry: The values obtained for the water vapour transmission rate are specific to the thickness of the test specimen.

3.2 water vapour permeance

ratio of the *water vapour transmission rate* (3.1) for a test specimen to the vapour pressure difference between the two specimen faces during the test

Note 1 to entry: It is expressed in nanograms per square metre per second per pascal ($\text{ng}\cdot\text{m}^{-2}\cdot\text{s}^{-1}\cdot\text{Pa}^{-1}$).

Note 2 to entry: Water vapour permeance values are specific to the thickness at which the specimen was tested.

3.3 water vapour permeability

numerical value of the product of permeance and thickness

Note 1 to entry: It is the quantity of water vapour transmitted per unit time through a given area of the material per unit vapour pressure difference between its faces for a unit thickness.

Note 2 to entry: It is expressed in nanograms per metre per second per pascal ($\text{ng}\cdot\text{m}^{-1}\cdot\text{s}^{-1}\cdot\text{Pa}^{-1}$).

Note 3 to entry: For homogeneous materials, values obtained for water vapour permeability are a property of the material.

3.4 water vapour diffusion resistance index

ratio of the *water vapour permeability* (3.4) of air to that of the material concerned

Note 1 to entry: It indicates how much less permeable the material is than an equally thick layer of stationary air at the same temperature.

Note 2 to entry: It is dimensionless.

Note 3 to entry: For homogeneous materials, values obtained for water vapour diffusion resistance index are a property of the material.

4 Principle

A test specimen is sealed to the open mouth of a test dish containing a desiccant. The assembly is then placed in an atmosphere whose temperature and humidity are controlled. Periodic weighing of the assembly is made to determine the rate of water vapour transmission through the specimen into the desiccant.

5 Apparatus and materials

5.1 Shallow circular open containers, made of a material impermeable to water vapour, such as glass or metal, of 65 mm minimum diameter and with tops slightly belled out to admit a wax seal. See [Annex A](#) for typical assemblies and [5.3](#) for assemblies requiring a template.

5.2 Measuring instruments, capable of determining linear dimensions in accordance with the requirements of [ISO 1923](#).

5.3 Circular template (with edge tapered to facilitate removal after use), to duplicate the exposed area of the specimen to the nearest $0,1\text{ cm}^2$. The template shall have an area that is at least 90 % of the exposed surface of the specimen to reduce the edge effect due to a non-linear vapour seal.

5.4 Pot or dish, for melting the sealant wax ([5.8](#)).

5.5 Analytical balance, capable of weighing the test assembly to an accuracy of $0,1\text{ mg}$.