
**Adhesives for organic electronic
devices — Determination of water
vapour transmission rate —**

**Part 1:
Adhesive film preparation methods**

*Adhésifs pour dispositifs électroniques organiques — Détermination
du taux de transmission de vapeur d'eau —*

Partie 1: Méthodes de préparation du film adhésif

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Published in Switzerland

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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 documents 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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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

A list of all parts in the ISO 21760 series can be found on the ISO website.

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.

Adhesives for organic electronic devices — Determination of water vapour transmission rate —

Part 1: Adhesive film preparation methods

1 Scope

This document specifies six methods for determining the water vapour transmission rate of adhesive films coated on a plastic substrate.

The adhesive is used in organic electronic devices such as organic light-emitting diodes.

The methods provide rapid measurement over a wide range of water vapour transmission rates.

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 2808, *Paints and varnishes — Determination of film thickness*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

ISO 15106 (all parts), *Plastics — Film and sheeting — Determination of water vapour transmission rate*

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3 Terms and definitions

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

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

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

— IEC Electropedia: available at <http://www.electropedia.org/>

3.1

water vapour transmission rate

amount of water vapour transmitted per unit area of *test specimen* (3.2) per unit time under specified conditions

Note 1 to entry: It is expressed in grams per square metre per 24 h [$\text{g}/(\text{m}^2 \times 24 \text{ h})$].

3.2

test specimen

supporting substrate with coating of adhesives applied to it

4 Principle

A test specimen consists of a non-self-supporting adhesive film on a plastic substrate. The test specimen is mounted in a transmission cell forming a sealed barrier between two chambers.

The upstream chamber is usually the wet side and the downstream chamber is usually the dry side.

The amount of water vapour transmitted through the specimen is detected by a sensor capable of providing an electrical output signal.

Since the water vapour transmission rate of a non-self-supporting adhesive cannot be measured directly, it is necessary to measure the water vapour transmission rate of the adhesive plus substrate and the substrate alone.

When calculating the water vapour transmission rate of a non-self-supporting adhesive, the water vapour transmission rate of the substrate shall be taken into account. The reciprocal number of the water vapour transmission rate of the adhesive is obtained by subtracting that of the substrate alone from that of the substrate plus adhesive.

Materials such as a light-emitting layer in the flexible organic electronic device are degraded by the penetration of a very small amount of water vapour. Both the plastic substrate and adhesive film (seal material) are required to have high barrier properties. The method for determining the water vapour transmission rate of plastic substrates is specified in accordance with one of ISO 15106-1, ISO 15106-2, ISO 15106-3, ISO 15106-4, ISO 15106-5, or ISO 15106-6.

The water vapour transmission rate of self-supporting adhesive film shall be determined in accordance with ISO 15106 (all parts).

5 Test specimens

5.1 Substrate for non-self-supporting adhesives

Any homogeneous material which has a water-vapour transmission rate larger than $1 \text{ g}/(\text{m}^2 \cdot 24 \text{ h})$ is suitable for use as the substrate for non-self-supporting adhesives, for instance poly(ethylene terephthalate) film.

Determine the mean thickness, d_s , of the substrate using a suitable method selected from those specified in ISO 4593 or ISO 2808.

The thickness of the PET substrate, d_s , shall be selected from the following values: 12 μm , 25 μm , 50 μm or 100 μm , because these are easy to obtain and commercially available.

The substrate should not be porous material.

5.2 Preparation of test specimens

5.2.1 Preparation of non-self-supporting adhesives on a substrate

The substrate shall be clean and dry.

Apply the adhesive material to be tested to the substrate in accordance with the manufacturer's application instruction.

The optimum thickness of the adhesive is dependent on the coating method. The total thickness of the adhesive shall be in the range of 3 μm to 60 μm . It is recommended to be selected from the following values: 5 μm , 10 μm , 20 μm or 50 μm .

Several coating methods are available. These are described in the following annexes:

- [Annex A](#): Spin coating application method;
- [Annex B](#): Blade coating application method;
- [Annex C](#): Spray coating application method.