SLOVENSKI STANDARD
SIST ISO 2528:2018

01-september-2018

Nadomešča:
SIST ISO 2528:1996

Plastni materiali - Določanje prepustnosti za vodno paro (WVTR) - Gravimetrična metoda

Sheet materials -- Determination of water vapour transmission rate (WVTR) -- Gravimetric (dish) method

Matériaux en feuilles -- Détermination du coefficient de transmission de la vapeur d'eau -- Méthode (de la capsule) par gravimétrie

Ta slovenski standard je istoveten z: **ISO 2528:2017**

ICS:

85.060 Papir, karton in lepenka Paper and board

SIST ISO 2528:2018 **en**

INTERNATIONAL STANDARD

ISO 2528

Third edition
2017-10

Sheet materials — Determination of water vapour transmission rate (WVTR) — Gravimetric (dish) method

Matériaux en feuilles — Détermination du coefficient de transmission de la vapeur d'eau — Méthode (de la capsule) par gravimétrie

Reference number
ISO 2528:2017(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html

This document was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps,* Subcommittee SC 2, *Test methods and quality specifications for paper and board.*

This third edition cancels and replaces the second edition (ISO 2528:1995), of which it constitutes a minor revision with the following changes:

— editorial updating;

— format updating.

Introduction

This document describes a method which can in theory be applied to any sheet material. In practice its main use is for flat, usually thin, materials that can be processed to form a water vapour-resistant barrier, as used in packaging, such as paper, board, plastics films or laminates of paper with films or metal foils, and for fabrics coated with rubber or plastics.

The water vapour pressure differential is the essential part of this test and in this instance it has not been possible to adopt the conditions recommended in ISO 554. In addition, the limits of temperature and humidity control are more exacting than those required for normal testing.

This test is intended to give reliable values of water vapour transmission rate (WVTR) by means of simple apparatus. The use of the results of any particular application should, however, be based upon experience.

Transmission rate is not a linear function of temperature nor, generally, of relative humidity difference. A determination carried out under certain conditions is not, therefore, necessarily comparable with one carried out under other conditions. The conditions of test should, therefore, be chosen to be as close as possible to the conditions of use.

Sheet materials — Determination of water vapour transmission rate (WVTR) — Gravimetric (dish) method

1 Scope

This document specifies a method for the determination of the water vapour transmission rate (often erroneously called "permeability") of sheet materials.

This method is not generally recommended for use if the transmission rate is expected to be less than 1 g/m^2 per day or for materials thicker than 3 mm. In such cases the method specified in ISO 9932 is preferred.

The method cannot be applied to film materials that are damaged by hot wax or that shrink to an appreciable extent under the test conditions used.

For some purposes it may be necessary to determine the transmission rate of creased material; a procedure for this is given in Annex A.

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 186, *Paper and board — Sampling to determine average quality*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

ISO 2231, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing*

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 http://www.iso.org/obp

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

3.1
water vapour transmission rate
WVTR
mass of water vapour transmitted through a unit area in a unit time under specified conditions of temperature and humidity

Note 1 to entry: Expressed in grams per square metre per day [g/(m^2 × d)].

Note 2 to entry: The WVTR depends upon the thickness, composition, homogeneity and permeability of the constituent material(s), and upon the conditions of temperature and relative humidity under which the test is carried out (see Annex B).

4 Principle

Dishes containing a desiccant and closed by the material to be tested are placed in a controlled atmosphere (see Annex B).

These dishes are weighed at suitable intervals of time and the WVTR is determined from the increase in mass when this increase has become proportional to the time interval.

5 Apparatus and material

Figure 1 shows examples of equipment which has proved satisfactory in use, but other equipment may be equally satisfactory.

5.1 Test dishes, shallow, of glass, aluminium, or stainless steel and of as large a diameter as can be accommodated on the balance to be used. The dishes should be light but rigid and resistant to corrosion under the test conditions. Dishes made from aluminium, grade Al 99,5 as specified in ISO 209 and protected by chemical or anodic oxidation have been found suitable.

Each dish has a groove around the rim for sealing the test piece with wax. This groove has a profile such that the test piece can be sealed over the opening of the dish and no water vapour can enter or escape the dish through the edges of the test piece.

The internal diameter of the dish shall be equal to or very slightly larger than the diameter of the waxing templates (5.3).

The internal depth of the dish below the plane of the test piece should not be less than 15 mm (deep dish) or 8 mm (shallow dish) and there shall be no obstruction within the dish that might interfere with the flow of water vapour between the test piece and the desiccant.

The surface area of the bottom of the dish where it is filled with desiccant shall be similar to that of the exposed surface of the test piece.

Each dish shall be assigned a different number.

5.2 Lids, each numbered to correspond with a dish and made from the same material as the dish, with an outer rim designed to fit neatly over the outside of the dish so that there is negligible loss of water vapour when the dishes are removed from the test atmosphere for weighing.

5.3 Waxing templates, to place the wax sealant easily and to allow the test area to be defined exactly.

Their diameter, *D,* should preferably be 79,8 mm ± 0,4 mm (corresponding to an area of 50 cm^2).

If any other diameter of template is used, this fact shall be mentioned in the test report. The diameter shall always be at least 56,1 mm (corresponding to an area of 25 cm^2), and shall be known to an accuracy better than 1 %.

These templates may be either:

a) cross-braced ring templates, which remain in place during the test. Their diameter, *D*, is the internal diameter of the ring. As many ring templates as dishes are required; or

b) cover templates, which shall be taken off when the applied wax has cooled, comprising a disc with a central handle, drilled with a small hole at a suitable point (see Figure 1), and having the edge chamfered at an angle of approximately 45°. Their diameter, *D*, is the diameter of this smaller circle.

Small guides can be fixed to the template to centre it automatically. A few templates are sufficient.

5.4 Sealant, a wax mixture (see Annex C) which adheres strongly to both the dish and the test piece and is not brittle at ordinary temperature, not hygroscopic and not susceptible to oxidation. A surface of 50 cm^2 of freshly melted wax when exposed for 24 h in condition B (see Annex B) shall not change in mass by more than 1 mg.

5.5 Water bath, for melting the wax.

5.6 Device for distributing the wax, of at least 25 ml capacity and a rapid rate of discharge, such as a pipette with a discharge tube of about 3 mm inner diameter or a metal pourer with an insulated handle.

5.7 Cutting template or test-piece cutter, of a size suitable for cutting circular test pieces of a diameter suitable for the dishes in use (see Figure 1). This diameter is slightly less than the inside diameter of the top of the dish (see Figure 2).

5.8 Desiccant, silica gel or anhydrous calcium chloride ($CaCl_2$), in the form of granules 1,6 mm to 4 mm in size or alternatively in the form of a friable flaked product 1,5 mm to 2,0 mm in size.

NOTE The limiting saturation of 1 g of calcium chloride is 0,1 g of water. The limiting saturation of 1 g of silica gel is 0,04 g of water.

5.9 Balance, for determining the mass of each dish, lid and contents to 0,1 mg.