

ICS 83.140.10

CCS G31



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 1037-2021

Replacing GB 1037-1988

**Test method for water vapor transmission of plastic film and
sheet - Desiccant method and water method**

塑料薄膜与薄片水蒸气透过性能测定 杯式增重与减重法

Issued on: November 26, 2021

Implemented on: June 1, 2022

**Issued by: State Administration for Market Regulation;
Standardization Administration of China**

Table of Contents

1	Scope
2	Normative references
3	Terms and definitions
4	Principle and method overview
5	Samples
6	Sample conditioning
7	Instruments and reagents
7.1	Instruments
7.2	Reagents
8	Test conditions...
9	Test procedures...
9.1.3	Constant temperature and humidity chamber method
9.1.4	Water vapor transmission performance tester method
9.2	Water method
10	Test results...
11	Test report

1 Scope

GB/T 1037-2021 is the Chinese national standard on test method for water vapor transmission of plastic film and sheet - desiccant method and water method, in the field of rubber and plastic industries. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 26 November 2021 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 June 2022. Classification: ICS 83.140.10, CCS G31. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies two cup methods for determining the water vapor transmission properties of plastic films and sheets - the desiccant method and the water method. This document is applicable to the determination of water vapor transmission properties of plastic films and sheets. This document can be used as a reference to the determinations of

the water vapor transmission properties of paper, non-woven fabrics, artificial leather, and other materials.

2 Normative references

The following documents contain the provisions which, through normative reference in this document, constitute the essential provisions of this document. For the dated referenced documents, only the versions with the indicated dates are applicable to this document; for the undated referenced documents, only the latest version (including all the amendments) is applicable to this document.

GB/T 2918 Plastics - Standard atmospheres for conditioning and testing

GB/T 6672 Plastics film and sheeting - Determination of thickness by mechanical scanning

GB/T 6682 Water for analytical laboratory use - Specification and test methods

ISO 2602:1980 Statistical interpretation of test results - Estimation of the mean - Confidence interval

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 water vapor transmission; WVT Under the conditions of specified temperature and relative humidity and a certain water vapor pressure difference between both sides of the sample, the mass of water vapor permeating the sample per unit area within 24 hours.

3.2 water vapor permeability P_v In a specified temperature and relative humidity environment, under a unit of water vapor pressure difference, the mass of water vapor permeating per unit thickness and unit area of the sample per unit time.

4 Principle and method overview

4.1 Principle Under the specified temperature and relative humidity conditions, and a certain water vapor pressure difference is maintained between both sides of the sample within a certain time range, the mass of water vapor permeating the sample is tested, and then performance parameters such as the water vapor transmission and water vapor permeability are calculated.

4.2 Method overview By the changing trend of the mass of the moisture-permeable cup during the test, the cup methods can be divided into the desiccant method (that is, the mass of the moisture- permeable cup gradually increases) and the water method (that is, the mass of the moisture-permeable cup gradually decreases). When the desiccant method and the water method are used for testing the same sample, the test results obtained by the two test methods are not exactly the same. The appropriate test method shall be selected

according to factors such as the sample itself and its actual use conditions. According to the instruments used, it can be further subdivided into the constant temperature and humidity chamber method and the water vapor transmission performance tester method. NOTE: In general, samples with high water vapor transmission are more suitable for the water method. For hygroscopic samples such as paper, non-woven fabrics, and artificial leather, attention shall be paid to the equilibrium time when the water method is used; if both the desiccant method and the water method can meet the test range requirements of water vapor transmission of hygroscopic samples or other special materials, it is necessary to additionally consider the influence of 100% relative humidity in the moisture-permeable cup on the sample in the water method.

5 Samples

5.1 The sample shall be representative, flat, uniform, and free of pollution, without holes, pinholes, creases, scratches, and other defects. When the sample is cut, it shall be ensured that the sample has no burrs. The sample area shall be larger than the permeable area of the moisture-permeable cup.

5.2 At least three samples for each group shall be taken. The test surface of the sample shall be selected correctly according to the test requirements and actual application conditions.

6 Sample conditioning

Unless otherwise specified, according to the provisions of GB/T 2918, the sample shall be conditioned for at least 4 hours in the "23/50" standard environment, and the standard environment level is level 2.

7.1 Instruments

7.1.1 Constant temperature and humidity chamber The fluctuation of temperature control is not more than 0.5 °C, the fluctuation of relative humidity is not more than 2%, and the wind speed is

0.5 m/s~

2.5 m/s. After the door is closed, the specified temperature and relative humidity shall be reached again within 15 minutes.

7.1.2 Analytical balance The division value is not more than

0.1 mg.

7.1.3 Moisture-permeable cup It shall be made of lightweight, corrosion-resistant, impermeable, and air-tight materials. The effective test area shall be at least 25 cm², and the area of desiccant or distilled water shall not be smaller than the area of the cup mouth.

Commonly used moisture- permeable cups include circular moisture-permeable cups with guide rings, square moisture-permeable cups with fixed molds, and circular moisture-permeable cups without sealants. The structures are shown in Figure 1, Figure 2, and Figure 3. Moisture- permeable cups of other shapes and structures can also be made according to test requirements. The circular moisture-permeable cup with a guide ring shown in Figure 1 is not suitable for testing with a water vapor transmission performance tester.

7.1.4.2 Test chamber The temperature and humidity are controllable and ensured to be constant. A suitable support structure shall be set in the chamber for placing the moisture-permeable cup, and a certain air flow rate shall be maintained to ensure that the test conditions at each position in the chamber are uniform. The temperature and relative humidity shall be monitored and recorded at intervals of 15 minutes at least. The fluctuation of temperature control is not more than 0.5 °C, the fluctuation of relative humidity is not more than 2%, and the wind speed is

0.3 m/s~

7.1.4.3 Balance weighing system It can realize automatic weighing, and the system division value is not more than

0.1 mg.

7.1.5 Desiccator It can be used to dry moisture-permeable cups, such as glass desiccators and polycarbonate desiccators.

7.1.6 Thickness gauge The division value of the instrument for measuring film thickness is not greater than

0.001 mm; the division value of the instrument for measuring sheet thickness is not greater than

0.01 mm.

7.2 Reagents

7.2.1 Desiccants It is used for desiccant method tests. Usually, anhydrous calcium chloride with a particle size of

0.60 mm~

2.36 mm that can pass through a certain size sieve is used, and it shall be dried in an oven at 200 °C±2 °C for 2 hours before use. If another desiccant with an adsorption effect is needed to be used, such as silica gel and molecular sieve, it shall be activated under corresponding conditions before use.

7.2.2 Distilled water It is used for water method tests. It shall meet the requirements of secondary water in GB/T 6682.