

ICS 83.140.10
CCS G 31



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

GB/T 43019.4-2025

**Determination of water vapour transmission rate for plastics
film and sheeting - Part 4: Gas chromatographic method**

塑料薄膜和薄片水蒸气透过率的测定 第4部分: 气相色谱法

(English Translation)

Issued on: October 5, 2025

Implemented on: May 1, 2026

Issued by: State Administration for Market Regulation

Table of Contents

Preface
Introduction
1 Scope
2 Normative References
3 Terms and Definitions
4 Principle
5 Samples
6 Sample Conditioning
7 Instruments
7.1 Overview
7.2 Permeation Chamber
7.3 Gas Chromatograph
7.4 Gas Flow Meter
7.5 Humidity controller (including water tank unit)
7.6 Vacuum Pump
8 Test conditions
9 Calibration Figure
10 Experimental Steps
11 Calculation
12 Experimental Results
13 Precision
14 Test Report
References

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 4 of "Determination of Water Vapor Transmission Rate of Plastic Films and Sheets".

The following sections of the measurement have been published.

---Determination of water vapor transmission rate of plastic films and sheets using humidity sensor method (GB/T 30412-2013);

---Determination of water vapor transmission rate of plastic films and sheets using infrared sensors (GB/T 26253-2010);

---Determination of water vapor transmission rate of plastic films and sheets by electrolytic sensor method (GB/T 21529-2008);

---Determination of water vapor transmission rate of plastic films and sheets - Part 5: Pressure sensor method (GB/T 43019.5-2023);

---Determination of water vapor transmission rate of plastic films and sheets - Part 7: Calcium corrosion method (GB/T 43019.7-2023).

This document is equivalent to ISO 15106-4:2008 "Determination of water vapor transmission rate of plastic films and sheets - Part 4: Gas chromatography" Spectral method.

The following minimal editorial changes have been made to this document.

---To harmonize with existing standards, the standard title has been changed to "Determination of Water Vapor Transmission Rate of Plastic Films and Sheets - Part 4: Gas Phase".

Chromatography.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China National Light Industry Council.

This document is under the jurisdiction of the National Technical Committee on Standardization of Plastic Products (SAC/TC48).

Introduction

"Determination of Water Vapor Transmission Rate of Plastic Films and Sheets" is a standard for determining the water vapor transmission rate of plastic films and sheets, applicable to films with barrier properties.

The performance standards for various plastic films and sheets provide support and are proposed to consist of seven parts.

---Determination of Water Vapor Transmission Rate of Plastic Films and Sheets using a Humidity Sensor Method. The aim is to determine the water vapor transmission rate of plastic films and sheets using a humidity sensor method.

Water vapor transmission rate of thin films and sheets.

---Determination of Water Vapor Transmission Rate of Plastic Films and Sheets using Infrared Sensors. The aim is to determine the water vapor transmission rate of plastic films and sheets using infrared sensors.

Water vapor transmission rate of thin films and sheets.

---Determination of Water Vapor Transmission Rate of Plastic Films and Sheets by Electrolytic Sensor Method. The aim is to determine the water vapor transmission rate of plastic films and sheets using an electrolytic sensor method.

Water vapor transmission rate of thin films and sheets.

---Determination of Water Vapor Transmission Rate of Plastic Films and Sheets, Part 4: Gas Chromatography. The purpose is to determine the water vapor transmission rate of plastic films and sheets using gas chromatography.

Determine the water vapor transmittance of plastic films and sheets.

---Determination of Water Vapor Transmission Rate of Plastic Films and Sheets, Part 5: Pressure Sensor Method. The aim is to utilize a pressure sensor...

The method for determining the water vapor transmittance of plastic films and sheets.

---Determination of Water Vapor Transmission Rate of Plastic Films and Sheets, Part 7: Calcium Corrosion Method. The purpose is to determine the water vapor transmission rate of plastic films and sheets using the calcium corrosion method.

The water vapor transmittance of thin films and sheets.

This document describes the determination of water vapor transmission rate of plastic films and sheets, and composite plastic films and sheets using gas chromatography.

The test method for water vapor transmission rate of thin sheets has become more systematic and standardized.

Determination of water vapor transmission rate of plastic films and sheets Part 4: Gas Chromatography

1 Scope

This document describes a method for determining the water vapor transmission rate of plastic films and sheets, and composite plastic films and sheets, using gas chromatography.

Note: This document provides a rapid method for determining water vapor transmission rate over a wide range.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

ISO 4593 Mechanical methods for determining the thickness of plastic films and sheets.

Note: GB/T 6672-2001 Mechanical measurement method for determination of thickness of plastic films and sheets (idt ISO 4593:1993)

3 Terms and Definitions

The following terms and definitions apply to this document.

Under specified test conditions, the mass of water vapor passing through a unit area of the sample per unit time.

Note: The unit is grams per square meter 24 hours [g/(m²·24h)].

4 Principles

When the sample is placed in the permeation chamber, it divides the chamber into a dry chamber and a wet chamber. The dry chamber is evacuated by a vacuum pump, while the wet chamber is filled with a relatively humid environment.

Water vapor is controlled at a specific level. Due to the humidity difference, water vapor permeates from the wet chamber through the sample into the dry chamber and during the sampling cycle, collecting a...

After a period of time, the absolute mass of the collected water vapor was measured using a gas chromatograph. The mass of the transmitted water vapor, the transmission time, and the transmission rate of the sample were then analyzed.

Calculate water vapor transmission rate based on area.

5 Samples

5.1

The samples should be representative, free of wrinkles, creases, and pinholes, and of uniform thickness. The area of each sample should be larger than the permeation chamber of the test unit.