
INTERNATIONAL STANDARD



2556

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Plastics — Determination of the gas transmission rate of films and thin sheets under atmospheric pressure — Manometric method

Matières plastiques — Détermination du coefficient de transmission d'un gaz par les feuilles et plaques minces, sous pression atmosphérique — Méthode manométrique

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FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2556 was drawn up by Technical Committee ISO/TC 61, *Plastics*, and circulated to the Member Bodies in February 1972.

It has been approved by the Member Bodies of the following countries :

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Belgium	Israel	Switzerland
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The Member Body of the following country expressed disapproval of the document on technical grounds :

Netherlands

Plastics — Determination of the gas transmission rate of films and thin sheets under atmospheric pressure — Manometric method

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of the gas transmission rate of plastics films and thin sheets.

The limits of the values which can be measured are from 1 to 20 000 cm³/m².d.atm.

The method can be used for measurements made either with air or with other test gases.

2 REFERENCE

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

3 DEFINITION

gas transmission rate: The volume of gas which, under steady conditions, crosses unit area of the sample in unit time under unit pressure difference and at constant temperature. This volume is expressed at standard temperature and pressure.

The rate depends on the thickness of the test specimen, and the reliability of the results depends on the evenness of the specimen thickness.

The rate is usually expressed in cubic centimetres (at 0 °C under standard atmospheric pressure per square metre per 24 h under a pressure difference of 1 atm (cm³/m².d.atm).

NOTES

1 The SI unit of gas transmission rate is fm/Pa.s

[1 fm (femtometre) = 10⁻¹⁵ m]

1 cm³/m².d.atm = 0,114 3 fm/Pa.s and

1 fm/Pa.s = 8,752 cm³/m².d.atm.

2 The standard atmospheric pressure corresponds to the pressure of a mercury column 760 mm high: either 1 013 mbar or 101,3 kPa.

4 PRINCIPLE

The plastic test specimen separates two chambers numbered 1 and 2. Chamber 1 contains the test gas at atmospheric pressure. Chamber 2, of known initial volume, has the air pumped out until the pressure is practically zero, then is hermetically sealed.

The quantity of gas which passes through the specimen from chamber 1 to chamber 2 is determined as a function of time by measuring the increases of pressure occurring in chamber 2 by means of a manometer.

The transmission rate is calculated from the values obtained, excluding the initial period during which the rate of passage of gas increases with time.

5 APPARATUS AND MATERIALS

The apparatus which comprises the parts described in 5.1 to 5.4, and of which suitable examples are shown in figures 1 and 2, must be placed in an enclosure with the temperature constant to within ± 2 °C during the test.

5.1 Metal cell consisting of two detachable parts, as follows:

1) an upper part forming the cylindrical chamber 1 to contain the test gas, provided with tubes for the entry and exit of the gas employed;

2) a lower part forming a plane and polished "test plate" of diameter 100 to 120 mm and having at its centre either

a) a cavity of about 20 mm diameter containing a perforated disc and below this a small empty space so that the total depth of the cavity is 12 to 15 mm (see figure 1). In this type of apparatus a filter paper must be interposed between the specimen and the test plate. The diameter of this filter paper must be near, but not greater than, the internal diameter of the gasket;

or,

b) a cavity about 60 mm diameter and a few millimetres deep, filled with a sintered disc of glass or of bronze (see figure 2).

The filter paper indicated in a) or the sintered disc indicated in b) are to support the test specimen while at the same time allowing the passage of gas.

In case b) the upper part of the sintered disc must be level with the test plate so that the specimen rests flat over its whole surface.

The closed space below the test specimen forms chamber 2, and is attached to a capillary tube (5.2) forming the manometer and to a vacuum pump (5.5).