

Plastics - Barrier films for agricultural and horticultural soil disinfection by fumigation - Part 2: Method for film permeability determination using a static technique

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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ICS 83.140.10

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English Version

Plastics - Barrier films for agricultural and horticultural
soil disinfection by fumigation - Part 2: Method for film
permeability determination using a static technique

Plastiques - Films barrière pour la désinfection par
fumigation des sols agricoles et horticoles - Partie 2:
Méthode de détermination de la perméabilité d'un film
utilisant une technique statique

Kunststoffe - Sperrschichtfolien für die Desinfektion
durch Begasung von Landwirtschafts- und
Gartenbauböden - Teil 2: Verfahren zur Bestimmung
der Durchlässigkeit einer Folie unter Verwendung
einer statischen Technik

This European Standard was approved by CEN on 20 November 2017.

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European foreword

This document (EN 17098-2:2018) has been prepared by Technical Committee CEN/TC 249 “Plastics”, the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2018, and conflicting national standards shall be withdrawn at the latest by July 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN not be held responsible for identifying any or all such patent rights.

EN 17098, *Plastics — Barrier films for agricultural and horticultural soil disinfection by fumigation*, consists of the following parts:

- *Part 1: Specifications for barrier films*
- *Part 2: Method for determining film permeability using a static technique*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This test method is based on ASTM E2945-14, *Standard Test Method for Film Permeability Determination Using Static Permeability Cells* [1].

The permeability of a thermoplastic film to a gaseous composition depends on the nature of the film, the properties of the chemical constituents of the gaseous composition and environmental conditions. Various values can be used to characterize permeability to a gaseous composition, including flux, diffusion coefficient, and mass transfer coefficient (MTC). Flux and diffusion coefficient depend on the concentration gradient across the film. However, it is recognized that mass transfer coefficient is independent of the concentration gradient and dependent only on the properties of the film and the chemical constituents of the gas, in addition to environmental conditions such as temperature and relative humidity on both sides of the film. It follows that mass transfer coefficient is an appropriate parameter to represent permeability to a specific gaseous composition.

WARNING — Users of this standard should be very familiar with standard laboratory practice. This standard is not intended to cover any safety problems associated with its use, if applicable. It is the user's responsibility to determine appropriate practices in terms of health and safety, and to ensure compliance with the applicable national regulatory requirements.

1 Scope

This document specifies a method for determining the gas permeability of films using a static technique. This document is applicable to thermoplastic barrier films for agricultural and horticultural soil disinfection using the fumigation technique.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following term and definition apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

permeability

ability of a material to transmit gases and liquids by passage through one surface and out at another surface by diffusion and sorption processes

[SOURCE: EN ISO 472:2013 [2], definition 2.690]

4 Principle

A test specimen is placed in a gas transmission cell so as to form a sealed barrier between two chambers. A gas is introduced into one of the chambers (source chamber) to permeate into the other chamber (receiving chamber). The gas concentrations in the source and receiving chambers are monitored over time by means of gas chromatography. The rate of variation in the concentrations is used to calculate the mass transfer coefficient.

5 Apparatus and equipment

5.1 Transmission cell

The transmission cell comprises a lower chamber (source chamber) and upper chamber (receiving chamber). The inside diameter of each chamber ranges from 120 mm to 150 mm and the height from 40 mm to 60 mm. The chambers are constructed from a stainless steel cylinder and each cylinder is welded at one end to a flat stainless steel plate (see Figure 1). As an alternative, the chambers are made of glass, with the dimensions given above.

In case of chambers made of glass, the exposure of the transmission cell to the direct sun light shall be avoided during testing.

The lower and upper chambers shall each have a connection piece halfway up the chamber, fitted with a septum or epoxy sealed valve for sampling purposes.

The surfaces in contact with the specimen shall be smooth and flat so that gas leakage does not occur.

Gas tightness between the two chambers shall be obtained either by means of a nitrile seal, or by attaching the film onto the two half-cells using epoxy glue.

The volume of each chamber shall be measured.