

Elastsed poorsed polümeermaterjalid. Õhuvoo läbilaskvuse määramine

Polymeric materials, cellular flexible - Determination of air flow permeability

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 4638:2000 sisaldab Euroopa standardi EN ISO 4638:1995 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 11.01.2000 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

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This standard is ratified with the order of Estonian Centre for Standardisation dated 11.01.2000 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

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ICS 83.100

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EUROPEAN STANDARD

EN ISO 4638

NORME EUROPÉENNE

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Descriptors: cellular materials, flexible cellular materials, tests, determination, permeability, air flow

English version

**Polymeric materials, cellular flexible -
Determination of air flow permeability
(ISO 4638:1984)**

Matériaux polymères alvéolaires souples
Détermination de la perméabilité à l'air
(ISO 4638:1984)

Weichelastische Schaumstoffe - Bestimmung der
Luftstromdurchlässigkeit (ISO 4638:1984)

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European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Ref. No. EN ISO 4638:1995 E

Foreword

The text of the International Standard from ISO/TC 45 "Rubber and rubber products" of the International Organization for Standardization (ISO) has been taken over as a European Standard by the Technical Committee CEN/TC 249 "Plastics".

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of an identical text or by endorsement, at the latest by November 1995, and conflicting national standards shall be withdrawn at the latest by November 1995.

According to CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 4638:1984 has been approved by CEN as a European Standard without any modification.

NOTE: Normative references to International publications are listed in annex ZA (normative).

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Annex ZA (normative)

**Normative references to international publications
with their relevant European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 845	1988	Cellular plastics and rubbers - Determination of apparent (bulk) density	EN ISO 845	1995

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International Standard



4638

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

**Polymeric materials, cellular flexible — Determination
of air flow permeability**

Matériaux polymères alvéolaires souples — Détermination de la perméabilité à l'air

First edition — 1984-05-15

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Ref. No. ISO 4638-1984 (E)

Descriptors: cellular materials, flexible cellular materials, tests, determination, permeability, air flow.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

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 4638 was developed by Technical Committee ISO/TC 45, *Rubber and rubber products*, and was circulated to the member bodies in February 1982.

It has been approved by the member bodies of the following countries:

Austria	Germany, F.R.	Romania
Belgium	India	South Africa, Rep. of
Brazil	Indonesia	Spain
Canada	Ireland	Sri Lanka
China	Mexico	Thailand
Czechoslovakia	Netherlands	Turkey
Denmark	Nigeria	USA
Egypt, Arab Rep. of	Poland	USSR
France	Portugal	

The member body of the following country expressed disapproval of the document on technical grounds:

United Kingdom

Polymeric materials, cellular flexible — Determination of air flow permeability

0 Introduction

The air flow permeability of cellular materials indicates, in an indirect manner, some of their structural properties. It may be used to establish correlations between the structure of these materials and some of their physical properties. It also enables identification of the modifications to cellular structures produced by chemical agents used in foaming, for example catalysts or surfactants.

This International Standard is, therefore, useful for two purposes:

- a) in studying the structure of cellular products in connection with their physical properties and their method of manufacture;
- b) in ensuring product quality (quality assurance).

NOTE — Details of publications relating to flow behaviour in both laminar and turbulent conditions are given in a bibliography.

1 Scope and field of application

This International Standard specifies a method for the determination of the permeability of flexible cellular polymeric materials to air flow.

It is applicable to test pieces cut from products of cellular material.

NOTE — ISO 7231, *Polymeric materials, cellular flexible — Method of assessment of air flow value at constant pressure drop*,¹⁾ specifies a simple quality control method which is also based on the flow of air through cellular materials. This can be used when it is not the intention to calculate the intrinsic properties of various materials in order to compare them, but merely to control the quality of a given cellular material.

2 References

ISO 471, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces*.

ISO 845, *Cellular rubbers and plastics — Determination of apparent density*.

3 Principle

Passing air under controlled conditions through a test piece in the form of a cylinder or parallelepiped. Measurement of the pressure drop between the two free faces of the test piece.

4 Symbols and terminology

4.1 Air flow permeability, K , is given by Darcy's law (see figure 1), which describes the air flow in a homogeneous and isotropic (see note 1) porous medium under laminar flow conditions (see note 2) by the equation

$$u = \frac{q_V}{A} = \frac{K \Delta p}{\eta \delta}$$

where

u is the linear air flow velocity, in metres per second;

q_V is the volumetric air flow rate, in cubic metres per second, crossing the test piece;

A is the right cross-sectional area, in square metres, of the test piece;

K is the flow permeability, in square metres, of the porous medium;

Δp is the pressure drop, in pascals, across the test piece;

η is the dynamic viscosity, in pascal seconds, of air;

δ is the thickness, in metres, of the test piece.

NOTES

1 For anisotropic materials, it is necessary to define the direction of the flow.

2 For the flow of air to be laminar in the interior of the porous medium, it is necessary for the following conditions to be fulfilled:

$$Re^* = \frac{u\sqrt{K}}{\nu} < n$$

where

Re^* is the modified Reynolds number;

ν is the kinematic viscosity, in square metres per second, of air;

1) At present at the stage of draft.