SLOVENSKI STANDARD
SIST EN ISO 9346:1997

01-december-1997

Toplotna izolacija - Prenos snovi - Fizikalne količine in definicije (ISO 9346:1987)

Thermal insulation - Mass transfer - Physical quantities and definitions (ISO 9346:1987)

Wärmeschutz - Stofftransport - Physikalische Größen und Definitionen (ISO 9346:1987)

Isolation thermique - Transfert de masse - Grandeurs physiques et définitions (ISO 9346:1987)

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Ta slovenski standard je istoveten z: EN ISO 9346:1996

ICS:

01.060	Veličine in enote	Quantities and units
27.220	Rekuperacija toplote. Toplotna izolacija	Heat recovery. Thermal insulation

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 9346

May 1996

ICS 01.040.91; 01.060.20; 91.120.10

Descriptors: Thermal insulation, quantities, units of measurement, symbols, definitions

English version

Thermal insulation - Mass transfer - Physical quantities and definitions (ISO 9346:1987)

Isolation thermique - Transfert de masse - Grandeurs physiques et définitions (ISO 9346:1987)

Wärmeschutz - Stofftransport - Physikalische Größen und Definitionen (ISO 9346:1987)

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CEN

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

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Foreword

The text of the International Standard from Technical Committee ISO/TC 163 "Thermal insulation" of the International Organization for Standardization (ISO) has been taken over as a European Standard by Technical Committee CEN/TC 89 "Thermal performance of buildings and building components", the secretariat of which is held by SIS .

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of an identical text or by endorsement, at the latest by November 1996, and conflicting national standards shall be withdrawn at the latest by November 1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of 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 9346:1987 has been approved by CEN as a European Standard without any modification.

INTERNATIONAL STANDARD

**ISO
9346**

First edition
1987-11-01

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1988-03-01

Thermal insulation — Mass transfer — Physical quantities and definitions

Isolation thermique — Transfert de masse — Grandeurs physiques et définitions

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Reference number
ISO 9346 : 1987 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, govern-mental 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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 9346 was prepared by Technical Committee ISO/TC 163, *Thermal insulation*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

INTERNATIONAL STANDARD   ISO 9346 : 1987 (E)

Thermal insulation — Mass transfer — Physical quantities and definitions

0 Introduction

This International Standard forms part of a series of vocabularies related to thermal insulation.

The series will include

ISO 7345, *Thermal insulation — Physical quantities and definitions.*

ISO 9251, *Thermal insulation — Heat transfer conditions and properties of materials — Vocabulary.*

ISO 9346, *Thermal insulation — Mass transfer — Physical quantities and definitions.*

ISO 9229, *Thermal insulation — Thermal insulating materials and products — Vocabulary.* [1]

ISO 9288, *Thermal insulation — Heat transfer by radiation — Physical quantities and definitions.* [1]

1 Scope and field of application

This International Standard defines physical quantities and other terms in the field of mass transfer relevant to thermal insulation systems, and gives the corresponding symbols and units.

2 General terms

2.1 mass transfer : Transmission of mass (especially moisture or air) by various mechanisms.

2.2 moisture : Water in gaseous, liquid or solid phase.

2.3 water vapour : Moisture in the gaseous phase.

2.4 water vapour diffusion : Movement of water vapour molecules in a gas mixture tending to equalize the vapour content in the air or the partial pressure of the vapour, with the total pressure being constant.

2.5 water vapour convection : Transfer of water vapour in a gas mixture by movement of the whole gas mixture due to a difference in total pressure.

2.6 hygroscopic sorption curve : Relation between moisture content in a porous material and the relative humidity of the ambient air at equilibrium.

NOTE — There are curves for sorption and for desorption. Because of measuring difficulties there is an upper limit for the relative humidity at 95 % to 98 %.

2.7 suction curve : Relation between the equalized moisture content in a porous material and the suction (negative pore pressure) in the pore water.

NOTE — Generally there are curves for sorption and for desorption. Theoretically the suction curve covers the whole moisture range, from absolute dryness to full saturation.

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1) At present at the stage of draft.

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3 Physical quantities and definitions	Symbol	Unit

3.1 humidity by volume : Mass of water vapour divided by the volume of the gaseous mixture. — v — kg/m³

NOTES

1 Humidity by volume is the same as the partial mass density of water vapour, ϱ_v.

2 At saturation the notations v_{sat} and $\varrho_{v,sat}$ are used.

3.2 humidity by mass : Mass of water vapour divided by the mass of dry air. — x — kg/kg

NOTE — At saturation the notation x_{sat} is used.

3.3 partial water vapour pressure : Partial pressure of water vapour in a gaseous mixture. — p_v — Pa

NOTE — At saturation the notation p_{sat} is used.

3.4 relative humidity : Actual humidity by volume divided by humidity by volume at saturation at the same temperature : — ϕ

$$\phi = \frac{v}{v_{sat}}$$

NOTE — Assuming an ideal gas behaviour

$$\phi = \frac{p_v}{p_{v,sat}}$$

3.5 specific enthalpy : Enthalpy divided by mass. — h — J/kg

3.5.1 specific latent enthalpy of evaporation or condensation — h_e — J/kg

3.5.2 specific latent enthalpy of melting (or freezing) — h_m — J/kg

3.6 moisture content mass by volume : Mass of evaporable water divided by volume of material. — w — kg/m³

NOTE — Volume of material can either be that of wet state or dry state and shall be specified when quoting moisture content. The method of evaporating water from a moist material must be stated.

3.7 moisture content volume by volume : Volume of evaporable water divided by volume of material. — ψ — m³/m³

NOTE — Volume of material can either be that of wet state or dry state and shall be specified when quoting moisture content. The method of evaporating water from a moist material must be stated.

3.8 moisture content mass by mass : Mass of evaporable water divided by mass of material. — u — kg/kg

NOTE — Mass of material can either be that of wet state or dry state and shall be specified when quoting moisture content. The method of evaporating water from a moist material must be stated.

3.9 degree of saturation : Mass of water in a porous body divided by the mass of water at saturation. — S

NOTE — The method of reaching saturation must be stated.

3.10 suction : The pressure difference between the pore water pressure and the ambient total pressure. — s — Pa

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	Symbol	Unit

3.11 **moisture flow rate** : Mass of moisture transferred to or from a system divided by time. G kg/s

3.12 **density of moisture flow rate** : Moisture flow rate divided by area. g kg/(m²·s)

3.13 **water vapour diffusion coefficient in the air** : Quantity defined by the following relation : D m²/s

$$\vec{g} = -D \text{ grad } v$$

where

$\vec{g}$ is the vector density of water vapour flow rate in air;

v is the humidity by volume.

NOTE — Fick's law describes water vapour diffusion in air.

3.14 **moisture permeability** : Quantities defined by the following relations :

a) permeability with regard to humidity by volume

$$\vec{g} = -\delta_v \text{ grad } v$$ δ_v m²/s

b) permeability with regard to partial vapour pressure

$$\vec{g} = -\delta_p \text{ grad } p_v$$ δ_p kg/(m·s·Pa)

where

$\vec{g}$ is the vector density of moisture flow rate;

v is the humidity by volume in the pores;

p_v is the partial vapour pressure in the pores.

NOTE — Water vapour transmission through porous materials can be related to different driving mechanisms. Humidity by volume or partial vapour pressure are commonly used.

The word diffusion should not be used in this context, as part of the moisture flow is in liquid phase.

The transfer coefficients are dependent on the level of the corresponding relative humidity or moisture content of the material.

3.15 **moisture permeance** : Quantities defined by the following relations :

a) permeance with regard to humidity by volume

$$g = W_v (v_1 - v_2)$$ W_v m/s

b) permeance with regard to partial vapour pressure

$$g = W_p (p_1 - p_2)$$ W_p kg/(m²·s·Pa)

where

g is the density of moisture flow rate perpendicular to the surfaces of a layer;

v_1 and v_2 are the ambient humidities by volume of air;

p_1 and p_2 are ambient partial vapour pressures.