SLOVENSKI STANDARD
oSIST prEN ISO 9288:2022

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Toplotna izolacija - Prenos toplote s sevanjem - Fizikalne količine in definicije (ISO/DIS 9288:2021)

Thermal insulation — Heat transfer by radiation — Physical quantities and definitions (ISO/DIS 9288:2021)

Wärmeschutz - Wärmeübertragung durch Strahlung - Physikalische Größen und Definitionen (ISO/DIS 9288:2021)

Isolation thermique — Transfert de chaleur par rayonnement — Grandeurs physiques et définitions (ISO/DIS 9288:2021)

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27.220	Rekuperacija toplote. Toplotna izolacija	Heat recovery. Thermal insulation
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Thermal insulation — Heat transfer by radiation — Physical quantities and definitions

Isolation thermique — Transfert de chaleur par rayonnement — Grandeurs physiques et définitions

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see /www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword .html.

This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*.

This second edition of ISO 9288 cancels and replaces the first edition (ISO 9288:1989), which has been technically revised.

This edition includes the following significant changes with respect to the previous edition:

— title of ISO/TC 163 corrected (Foreword);

—delete the unit where two units existed;

—add the mean of d and d_{∞} (7.15);

—add the formula numbers.

Introduction

This document is intended to be used in conjunction with other vocabularies related to thermal insulation. These include:

— *ISO 7345, Thermal performance of buildings and building elements −Physical quantities and definitions*

— *ISO 9229, Thermal insulation − Vocabulary*

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

— *ISO 9346, Hygrothermal performance of buildings and building materials −Physical quantities for mass transfer − Vocabulary*

Thermal insulation — Heat transfer by radiation — Physical quantities and definitions

1 Scope

This document defines physical quantities and other terms in the field of thermal insulation relating to heat transfer by radiation.

2 Normative references

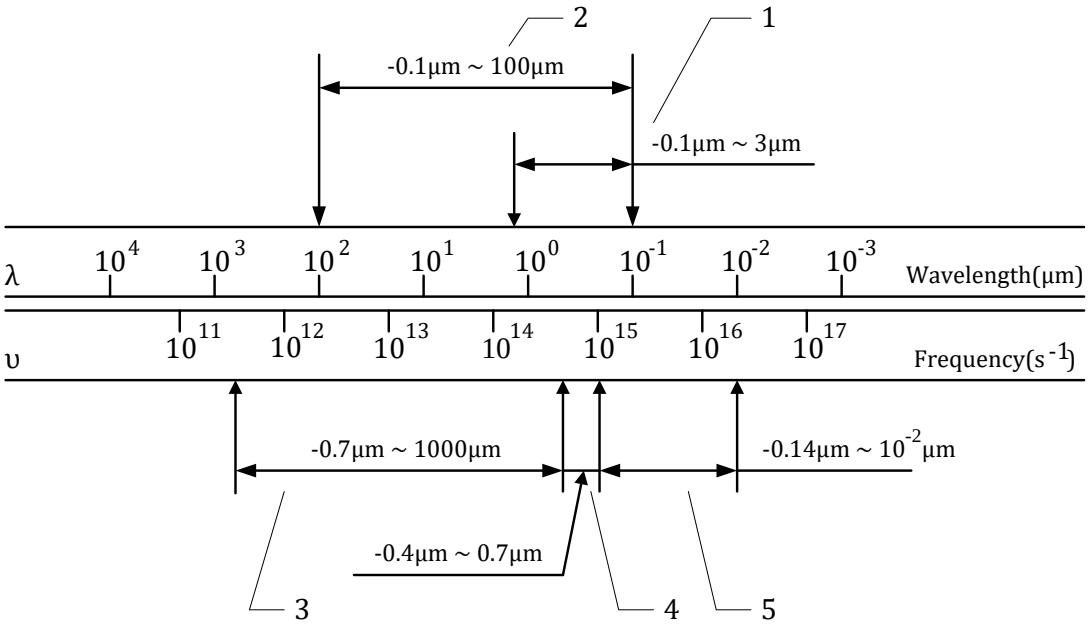
The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

— ISO 7345, *Thermal performance of buildings and building elements − Physical quantities and definitions*

3 Terms and definitions

3.1
thermal radiation
Electromagnetic radiation emitted at the surface of an opaque body or inside an element of a semi-transparent volume.

The thermal radiation is governed by the temperature of the emitting body and its radiative characteristics. It is interesting from a thermal viewpoint when the wavelength range falls between 0, l µm and 100 µm (see figure 1).



Key
1—Solar radiation.

2—Thermal radiation. 3—
Infrared.
4—Visible.
5—Ultraviolet.

Figure 1 — Electromagnetic wave spectrum

3.2
heat transfer by radiation
Energy exchanges between bodies (apart from one another) by means of electromagnetic waves.

These exchanges can occur when the bodies are separated from one another by vacuum or by a transparent or a semi-transparent medium. To evaluate these radiation heat exchanges it is necessary to know how opaque and semi-transparent bodies emit, absorb and transmit radiation as a function of their nature, relative position and temperature.

3.3
Classification of the physical terms associated with thermal radiation
Physical terms associated with thermal radiation are classified according to two criteria:

— spectral distribution

— spatial distribution (directional) of the radiation.

These physical terms are:

total, if they are related to the entire spectrum of thermal radiation (this designation can be considered as implicit);

spectral or monochromatic, if they are related to a spectral interval centred on the wavelength A;
hemispherical, if they are related to all directions along which a surface element can emit or receive radiation;

directional, if they are related to the directions of propagation defined by a solid angle around the defined direction.

3.4
Classification of materials in relation with radiative transfer
Opaque medium: Medium which does not transmit any fraction of the incident radiation.

The absorption, emission, reflection of radiation can be handled as surface phenomena.

Semi-transparent medium: Medium in which the incident radiation is progressively attenuated inside the material by absorption or scattering, or both.

The absorption, scattering and emission of radiation are bulk (volume) phenomena.

The radiative properties of an opaque or semi-transparent medium are generally a function of the spectral and directional distribution of incident radiation and of the temperature of the medium.

Note 1 to entry: Thermal insulating materials are generally semi-transparent media.

4 Terms related to surfaces either receiving, transferring or emitting a thermal radiation

4.1
radiant heat flow rate; radiant flux
Φ

Heat flow rate emitted, transferred or received by a system in form of electromagnetic waves.

Note 1 to entry: This is a total hemispherical quantity.

Note 2 to entry: Unit: W.

4.2
total intensity
I_Ω

Radiant heat flow rate divided by the solid angle around the direction $\vec{\Delta}$:

$$I_\Omega = \frac{\partial \phi}{\partial \Omega} \tag{1}$$

Note 1 to entry: Unit: W/sr.

4.3
total radiance
L_Ω

Radiant heat flow rate divided by the solid angle around the direction $\vec{\Delta}$ and the projected area normal to this direction :

$$L_\Omega = \frac{\partial^2 \Phi}{\partial \Omega \, \partial (A \cos\theta)} \tag{2}$$

Note 1 to entry: Unit: W/(m^2 · sr).

4.4
spectral radiant heat flow rate
Φ_λ

Radiant heat flow rate divided by the spectral interval centred on the wavelength λ:

$$\phi_\lambda = \frac{\partial \phi}{\partial \lambda} \tag{3}$$

Note 1 to entry: Unit: W/m.

4.5
spectral intensity
$I_{\Omega\lambda}$

Total intensity divided by the spectral interval centred on the wavelength λ:

$$I_{\Omega\lambda} = \frac{\partial I_\Omega}{\partial \lambda} \tag{4}$$

Note 1 to entry: Unit: W/(sr · m).