

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

The European Standard EN ISO 9288:1996 has the status of a British Standard

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee RHE/9, Thermal insulating materials, upon which the following bodies were represented:

- Autoclaved Aerated Concrete Products Association
- Chartered Institution of Building Services Engineers
- Combustion Engineering Association
- Concrete Block Association
- Cork Industry Federation
- Cranfield University
- Department of Health
- Department of the Environment (Building Research Establishment)
- Department of Trade and Industry (National Physical Laboratory)
- Electricity Association
- Eurisol (UK Mineral Wool Association)
- European Phenolic Foam Association
- Gypsum Products Development Association
- Power Generation Contractors' Association (PGCA BEAMA Ltd.)
- Royal Institute of British Architects
- Thermal Insulation Manufacturers and Suppliers' Association (TIMSA)
- Thermal Insulations Contractors' Association

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Calcium Silicate Brick Association Limited
- Institute of Refrigeration
- SGS United Kingdom Ltd.

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 July 1996

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The following BSI references relate to the work on this standard:
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National foreword

This British Standard has been prepared by Technical Committee RHE/9, and is the English language version of EN ISO 9288 *Thermal insulation — Heat transfer by radiation — Physical quantities and definitions*, published by the European Committee for Standardization (CEN). It is identical with ISO 9288:1989 published by the International Organization for Standardization (ISO).
EN ISO 9288 was produced as a result of international discussion in which the UK took an active part.

Cross-references

International Standard	Corresponding British Standard
ISO 7345:1987	BS EN ISO 7345:1996 <i>Thermal insulation. Physical quantities and definitions</i> (Identical)
ISO 9251:1987	BS EN ISO 9251:1996 <i>Thermal insulations. Heat transfer. Conditions and properties of materials. Vocabulary</i> (Identical)

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

English version

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

(ISO 9288:1989)

Isolation thermique — Transfert de chaleur par
rayonnement — Grandeurs physiques et
définitions
(ISO 9288:1989)

Wärmeschutz — Wärmeübertragung durch
Strahlung — Physikalische Größen und
Definitionen
(ISO 9288:1989)

This European Standard was approved by CEN on 1995-01-05. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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 United Kingdom.

Introduction

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

The series will include

ISO 7345:1987, *Thermal insulation — Physical quantities and definitions*.

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

ISO 9251:1987, *Thermal insulation — Heat transfer conditions and properties of materials — Vocabulary*.

ISO 9346:1987, *Thermal insulation — Mass transfer — Physical quantities and definitions*.

1 Scope

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

2 Normative reference

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 7345:1987, *Thermal insulation — Physical quantities and definitions*.

3 General terms

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 0,1 μm and 100 μm (see Figure 1)

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

¹⁾ To be published.

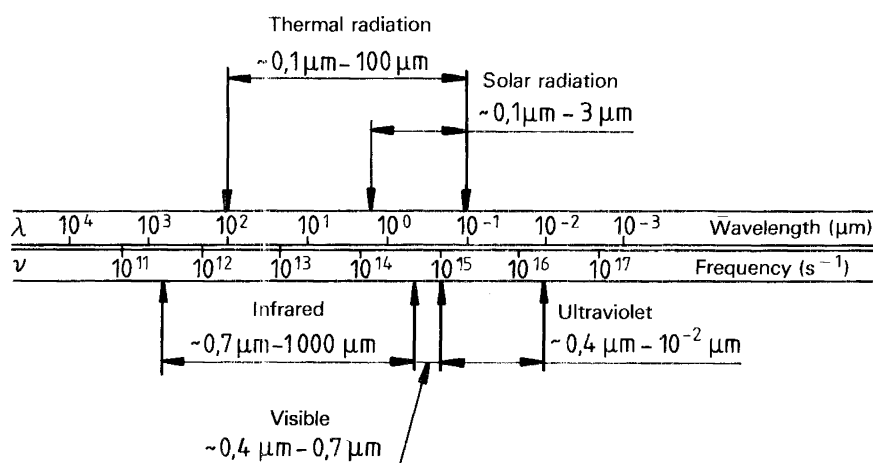


Figure 1 — Electromagnetic wave spectrum

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 λ ;

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 Thermal insulating materials are generally semi-transparent media.