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**Gradbene komponente in gradbeni elementi - Toplotna upornost in toplotna prehodnost - Računska metoda (ISO/DIS 6946:2005)**

Building components and building elements - Thermal resistance and thermal transmittance - Calculation method (ISO/DIS 6946:2005)

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English version

**Building components and building elements - Thermal  
resistance and thermal transmittance - Calculation method  
(ISO/DIS 6946:2005)**

Composants et parois de bâtiments - Résistance thermique  
et coefficient de transmission thermique - Méthode de  
calcul (ISO/DIS 6946:2005)

Bauteile - Wärmedurchlasswiderstand und  
Wärmedurchgangskoeffizient - Berechnungsverfahren  
(ISO/DIS 6946:2005)

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

## Foreword

This document (prEN ISO 6946:2005) has been prepared by Technical Committee ISO/TC 163 "Thermal insulation" in collaboration with Technical Committee CEN/TC 89 "Thermal performance of buildings and building components", the secretariat of which is held by SIS.

This document is currently submitted to the parallel Enquiry.

This document will supersede EN ISO 6946:1996.

### Endorsement notice

The text of ISO/DIS 6946:2005 has been approved by CEN as prEN ISO 6946:2005 without any modifications.

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## DRAFT INTERNATIONAL STANDARD ISO/DIS 6946

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

# Building components and building elements — Thermal resistance and thermal transmittance — Calculation method

*Composants et parois de bâtiments — Résistance thermique et coefficient de transmission thermique — Méthode de calcul*

[Revision of first edition (ISO 6946:1996)]

ICS 91.060.01; 91.120.10

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## Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

ISO 6946 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 2, *Calculation methods*.

This second edition cancels and replaces the first edition (ISO 6946:1996). A summary of the principal changes to the clauses that have been technically revised is given below.

Clause	Changes
Introduction	Deleted, but replaced by Note in Clause 4.
5.4.2	Clarification of the applicability of Table 3.
5.4.3	Complete revision.
6.2.1	New text to allow calculation of a component that is part of a complete element. Clarification of exceptions.
Annex B	Additional data for other temperature differences across cavities. Correction to formula for radiation transfer in divided airspaces.
Annex C	[Reviewed but not changed.]
Annex D	D.2 completely re-written to clarify the intentions. The former Annex E has been deleted (national annexes can be attached to the standard giving examples according to local building traditions).
Annex D	D.3 gives a revised procedure for mechanical fasteners, including recessed fasteners.
Annex D	D.4 does not apply in cooling situations.



# Building components and building elements — Thermal resistance and thermal transmittance — Calculation method

## 1 Scope

This standard gives the method of calculation of the thermal resistance and thermal transmittance of building components and building elements, excluding doors, windows and other glazed units, components which involve heat transfer to the ground, and components through which air is designed to permeate.

The calculation method is based on the appropriate design thermal conductivities or design thermal resistances of the materials and products involved.

The method applies to components and elements consisting of thermally homogeneous layers (which can include air layers).

The standard also gives an approximate method that can be used for elements containing inhomogeneous layers, including the effect of metal fasteners by means of the correction term given in Annex D. Other cases where insulation is bridged by metal are outside the scope of this standard.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7345, *Thermal insulation - Physical quantities and definitions*

ISO 10456, *Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values<sup>1)</sup>*

ISO 13789, *Thermal performance of buildings - Transmission and ventilation heat transfer coefficients - Calculation method<sup>2)</sup>*

## 3 Terms, definitions, symbols and units

### 3.1 Terms and definitions

For the purposes of this standard the terms and definitions in ISO 7345 and ISO 10456 apply, together with the following.

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1) Revision of ISO 10456:1999 to be published.

2) Revision of ISO 13789:1999 to be published.

**3.1.1**

**building element**

major part of a building such as a wall, floor or roof

**3.1.2**

**building component**

building element or a part of it

NOTE In this standard the word "component" is used to indicate both element and component.

**3.1.3**

**thermally homogeneous layer**

layer of constant thickness having thermal properties which are uniform or which may be regarded as being uniform

**3.2 Symbols and units**

Symbol	Quantity	Unit
$A$	area	$m^2$
$d$	thickness	$m$
$h$	surface heat transfer coefficient	$W/(m^2 \cdot K)$
$R$	design thermal resistance	$m^2 \cdot K/W$
$R_g$	thermal resistance of airspace	$m^2 \cdot K/W$
$R_{se}$	external surface resistance	$m^2 \cdot K/W$
$R_{si}$	internal surface resistance	$m^2 \cdot K/W$
$R_T$	total thermal resistance (environment to environment)	$m^2 \cdot K/W$
$R_T^+$	upper limit of total thermal resistance	$m^2 \cdot K/W$
$R_T^-$	lower limit of total thermal resistance	$m^2 \cdot K/W$
$R_u$	thermal resistance of unheated space	$m^2 \cdot K/W$
$U$	thermal transmittance	$W/(m^2 \cdot K)$
$\lambda$	design thermal conductivity	$W/(m \cdot K)$

**4 Principles**

The principle of the calculation method is to:

- a) obtain the thermal resistance of each thermally homogeneous part of the component;
- b) combine these individual resistances so as to obtain the total thermal resistance of the component, including (where appropriate) the effect of surface resistances.

Thermal resistances of individual parts are obtained according to 5.1.

The values of surface resistance given in 5.2 are appropriate in most cases. Annex A gives detailed procedures for low-emissivity surfaces, specific external wind speeds, and non-planar surfaces.