SIST

SLOVENSKI STANDARD
SIST EN ISO 23993:2011

01-marec-2011

Toplotnoizolacijski proizvodi za opremo stavb in industrijske inštalacije - Določevanje projektne toplotne prevodnosti (ISO 23993:2008, popravljena različica 2009-10-01)

Thermal insulation products for building equipment and industrial installations - Determination of design thermal conductivity (ISO 23993:2008, Corrected version 2009-10-01)

Wärmedämmung an betriebstechnischen Anlagen in der Industrie und der technischen Gebäudeausrüstung - Bestimmung der Betriebswärmeleitfähigkeit (ISO 23993:2008, korrigierte Fassung 2009-10-01)

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Détermination de la conductivité thermique utile (ISO 23993:2008, Version corrigée 2009-10-01)

Ta slovenski standard je istoveten z: EN ISO 23993:2010

ICS:

27.220	Rekuperacija toplote. Toplotna izolacija	Heat recovery. Thermal insulation
91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials

SIST EN ISO 23993:2011   **en,fr,de**

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 23993

November 2010

Supersedes EN ISO 23993:2008

English Version

Thermal insulation products for building equipment and industrial installations - Determination of design thermal conductivity (ISO 23993:2008, Corrected version 2009-10-01)

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Détermination de la conductivité thermique utile (ISO 23993:2008, Version corrigée 2009-10-01)

Wärmedämmung an betriebstechnischen Anlagen in der Industrie und der technischen Gebäudeausrüstung - Bestimmung der Betriebswärmeleitfähigkeit (ISO 23993:2008, korrigierte Fassung 2009-10-01)

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Ref. No. EN ISO 23993:2010: E

EN ISO 23993:2010 (E)

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Foreword

The text of ISO 23993:2008, Corrected version 2009-10-01 has been prepared by Technical Committee ISO/TC 163 "Thermal performance and energy use in the built environment" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 23993:2010 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 May 2011, and conflicting national standards shall be withdrawn at the latest by May 2011.

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This document supersedes EN ISO 23993:2008.

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Endorsement notice

The text of ISO 23993:2008, Corrected version 2009-10-01 has been approved by CEN as a EN ISO 23993:2010 without any modification.

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INTERNATIONAL
STANDARD

ISO
23993

First edition
2008-02-01

Corrected version
2009-10-01

Thermal insulation products for building equipment and industrial installations — Determination of design thermal conductivity

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles — Détermination de la conductivité thermique utile

Reference number
ISO 23993:2008(E)

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ISO 23993:2008(E)

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ISO 23993:2008(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, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 23993 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 89, *Thermal performance of buildings and building components*, in collaboration with ISO Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 2, *Calculation methods*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This International Standard is one of a series of standards on methods for the design and evaluation of the thermal performance of building equipment and industrial installations.

This corrected version of ISO 23993:2008 incorporates the following corrections plus other minor editorial modifications.

Clause 4: The following two rows have been added to the table:

N	number of spacers per square metre	—

$\Delta\lambda_{sq}$	thermal conductivity per spacer per square metre	W/(m·K)

Clause 6: Equations (1) and (2) have been re-inserted:

$$\lambda = \lambda_d F + \Delta\lambda \tag{1}$$

$$F = F_{\Delta\theta} F_m F_a F_C F_c F_d F_j \tag{2}$$

7.9.2.2: The calculations have been modified as follows (i.e. with the substitution of $\Delta\lambda_{sq}$, the thermal conductivity per spacer per square metre, for $\Delta\lambda$ i.e., with the deletion of "/spacers/m^2" from the units):

Spacers of steel in the form of a flat bar

30 mm $\times$ 3 mm $\qquad\qquad$ $\Delta\lambda_{sq} = 0{,}003\ 5$ W/(m·K)

40 mm $\times$ 4 mm $\qquad\qquad$ $\Delta\lambda_{sq} = 0{,}006\ 0$ W/(m·K)

50 mm $\times$ 5 mm $\qquad\qquad$ $\Delta\lambda_{sq} = 0{,}008\ 5$ W/(m·K)

A new Equation (6) has been added to define the relationship between $\Delta\lambda$ and $\Delta\lambda_{sq}$ and the original Equation (6) renumbered to Equation (7).

7.9.3: The units "W(m·K)" have been corrected to "W/(m·K)".

A.4.1 (twice) and A.4.2 (twice): The term "specific" has been added to the definition of W, "specific airflow resistance."

Annex B: The additional subtitles and introductory text, "B.1 Insulation materials" and "B.2 Conditions" have been added. The line "Determination of the conversion factors and $\Delta\lambda$" has been restyled as B.3 and introductory text added.

Table C.1: The vertical line separating the subheadings "calcium-magnesium silicate fibre" and "calcium silicate" and "microporous insulants" each from the subheading "Insulation" has been moved one column to the left, i.e. from between the pictures for the two pipes to between the column "Application..." and the picture of the horizontal pipe (consistent with other similar rows such as that for "mineral wool").

Table C.1 (four times): The term "airflow resistance" has been replaced with the term "airflow resistivity".

ISO 23993:2008(E)

Introduction

The establishment of design values for thermal conductivity for the calculation of the thermal performance of insulation systems for building equipment and industrial installations requires a consideration of various possible influences affecting the thermal properties of the insulation products employed due to the operational conditions of any individual insulation system.

Among these influences could be:

⎯ the non-linearity of the thermal conductivity curve over the temperature range in which the insulant may be employed;

⎯ the thickness effect;

⎯ the effect of moisture in the insulant;

⎯ ageing effects, beyond those already incorporated in the declared value;

⎯ special installation effects such as single- or multi-layered installation.

In this International Standard, the conversion factors F, that need to be used in a variety of applications for a variety of insulation products, are given and the principles and general equations as well as some guidance for the establishment of design values for the calculation of the thermal performance of insulation systems are described. The conversion factors valid for commonly employed insulation products are given in annexes. They are well established in some cases and for some materials. Where experience is lacking and conversion factors cannot be established accurately, they are given in the form of an "educated estimate" so that the calculation result will be on the safe side, i.e. the calculated heat transfer will be greater than that actually occurring when the calculation has obeyed the rules of this International Standard.

INTERNATIONAL STANDARD

ISO 23993:2008(E)

Thermal insulation products for building equipment and industrial installations — Determination of design thermal conductivity

1 Scope

This International Standard gives methods to calculate design thermal conductivities from declared thermal conductivities for the calculation of the thermal performance of building equipment and industrial installations.

These methods are valid for operating temperatures from −200 °C to +800 °C.

The conversion factors, established for the different influences, are valid for the temperature ranges indicated in the relevant clauses or annexes.

2 Normative references

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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 8497, *Thermal insulation — Determination of steady-state thermal transmission properties of thermal insulation for circular pipes*

ISO 9053, *Acoustics — Material for acoustical applications — Determination of airflow resistance*

ISO 9229, *Thermal insulation — Vocabulary*

ISO 13787, *Thermal insulation products for building equipment and industrial installations — Determination of declared thermal conductivity*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345, ISO 9229 and the following apply.

3.1
declared thermal conductivity
value of the thermal conductivity of a material or product used for building equipment and industrial installations:

⎯ based on measured data at reference conditions of temperature and humidity;

⎯ given as a limit value, in accordance with the determination method in ISO 13787;

⎯ corresponding to a reasonable expected service lifetime under normal conditions