



NSAI
Standards

Irish Standard
I.S. EN ISO 23993:2010

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

I.S. EN ISO 23993:2010

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWIFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces:
EN ISO 23993:2008

This document is based on:
EN ISO 23993:2010

Published:
1 December, 2010

This document was published
under the authority of the NSAI
and comes into effect on:
1 December, 2010

ICS number:
91.120.10
91.100.60
27.220

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

I.S. EN ISO 23993:2010

EUROPEAN STANDARD

EN ISO 23993

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2010

ICS 27.220; 91.120.10; 91.100.60

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)

This European Standard was approved by CEN on 11 October 2010.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
----------------------	----------

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.

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

This document supersedes EN ISO 23993:2008.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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.

This page is intentionally left BLANK.

I.S. EN ISO 23993:2010
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)

© ISO 2008

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols	2
5 Determination of declared thermal conductivity	2
6 Determination of the design value of thermal conductivity	3
7 Conversion of available data	3
7.1 General	3
7.2 Conversion factor for temperature difference	4
7.3 Conversion factor for moisture	4
7.4 Conversion factor for ageing	5
7.5 Conversion factor for compression	5
7.6 Conversion factor for convection	5
7.7 Conversion factor for thickness effect	5
7.8 Conversion factor for regular joints	5
7.9 Additional thermal conductivity for regularly insulation-related thermal bridges, e.g. spacers	6
Annex A (normative) Conversion factors	8
Annex B (informative) Examples of determination of the design thermal conductivity	20
Annex C (informative) Approximate values of conversion factors	23
Bibliography	31

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:

$$\lambda = \lambda_d F + \Delta\lambda \quad (1)$$

$$F = F_{\Delta 0} F_m F_a F_c F_d F_j \quad (2)$$

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/m²” from the units):

Spacers of steel in the form of a flat bar

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

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

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

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”.

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.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- Looking for additional Standards? Visit Intertek Inform Infostore
 - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-