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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

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Contents

Page

Foreword

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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.

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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 $\Delta\lambda_{sq} = 0{,}003\ 5$ W/(m·K)

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

    50 mm $\times$ 5 mm $\Delta\lambda_{sq} = 0{,}008\ 5$ 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".

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.