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Thermal performance of buildings - Heat transfer via the ground - Calculation methods

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NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 13370:2008 sisaldab Euroopa standardi EN ISO 13370:2007 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 13370:2008 consists of the English text of the European standard EN ISO 13370:2007.
Standard on kinnitatud Eesti Standardikeskuse 30.01.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 30.01.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 15.12.2007.	Date of Availability of the European standard text 15.12.2007.
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Thermal performance of buildings - Heat transfer via the ground - Calculation methods (ISO 13370:2007)

Performance thermique des bâtiments - Transfert de chaleur par le sol - Méthodes de calcul (ISO 13370:2007)

Wärmetechnisches Verhalten von Gebäuden - Wärmeübertragung über das Erdreich - Berechnungsverfahren (ISO 13370:2007)

This European Standard was approved by CEN on 7 December 2007.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN ISO 13370:2007) has been prepared by Technical Committee ISO/TC 163 "Thermal performance and energy use in the built environment" in collaboration with 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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.

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Endorsement notice

The text of ISO 13370:2007 has been approved by CEN as a EN ISO 13370:2007 without any modification.

Contents

Page

Introduction

This International Standard provides the means (in part) to assess the contribution that building products and services make to energy conservation and to the overall energy performance of buildings.

In contrast with ISO 6946, which gives the method of calculation of the thermal transmittance of building elements in contact with the external air, this International Standard deals with elements in thermal contact with the ground. The division between these two International Standards is at the level of the inside floor surface for slab-on-ground floors, suspended floors and unheated basements, and at the level of the external ground surface for heated basements. In general, a term to allow for a thermal bridge associated with the wall/floor junction is included when assessing the total heat loss from a building using methods such as ISO 13789.

The calculation of heat transfer through the ground can be done by numerical calculations, which also allow analysis of thermal bridges, including wall/floor junctions, for assessment of minimum internal surface temperatures.

In this International Standard, methods are provided which take account of the three-dimensional nature of the heat flow in the ground below buildings.

Thermal transmittances of floors give useful comparative values of the insulation properties of different floor constructions, and are used in building regulations in some countries for the limitation of heat losses through floors.

Thermal transmittance, although defined for steady-state conditions, also relates average heat flow to average temperature difference. In the case of walls and roofs exposed to the external air, there are daily periodic variations in heat flow into and out of storage related to daily temperature variations, but this averages out, and the daily average heat loss can be found from the thermal transmittance and daily average inside-to-outside temperature difference. For floors and basement walls in contact with the ground, however, the large thermal inertia of the ground results in periodic heat flows related to the annual cycle of internal and external temperatures. The steady-state heat flow is often a good approximation to the average heat flow over the heating season.

In addition to the steady-state part, a detailed assessment of floor losses is obtained from annual periodic heat transfer coefficients related to the thermal capacity of the soil, as well as its thermal conductivity, together with the amplitude of annual variations in monthly mean temperature.

Annex D provides a method for incorporating heat transfers to and from the ground into calculations undertaken at short time steps (e.g. one hour).

Worked examples illustrating the use of the methods in this International Standard are given in Annex K.

Thermal performance of buildings — Heat transfer via the ground — Calculation methods

1 Scope

This International Standard provides methods of calculation of heat transfer coefficients and heat flow rates for building elements in thermal contact with the ground, including slab-on-ground floors, suspended floors and basements. It applies to building elements, or parts of them, below a horizontal plane in the bounding walls of the building situated

— for slab-on-ground floors, suspended floors and unheated basements, at the level of the inside floor surface;

NOTE In some cases, external dimension systems define the boundary at the lower surface of the floor slab.

— for heated basements, at the level of the external ground surface.

This International Standard includes calculation of the steady-state part of the heat transfer (the annual average rate of heat flow) and the part due to annual periodic variations in temperature (the seasonal variations of the heat flow rate about the annual average). These seasonal variations are obtained on a monthly basis and, except for the application to dynamic simulation programmes in Annex D, this International Standard does not apply to shorter periods of time.

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 6946, *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

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

ISO 10211, *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations*

ISO 10456, *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values*

ISO 14683, *Thermal bridges in building construction — Linear thermal transmittance — Simplified methods and default values*