SLOVENSKI STANDARD
SIST EN 12412-2:2003

01-december-2003

Toplotne lastnosti oken, vrat in polken – Ugotavljanje toplotne prehodnosti z metodo komorne naprave – 2. del: Okvirji

Thermal performance of windows, doors and shutters - Determination of thermal transmittance by hot box method - Part 2: Frames

Wärmetechnisches Verhalten von Fenstern, Türen und Abschlüssen - Bestimmung des Wärmedurchgangskoeffizienten mittels des Heizkastenverfahrens - Teil 2: Rahmen

Performance thermique des fenetres, portes et fermetures - Détermination du coefficient de transmission thermique par la méthode de la boîte chaude - Partie 2: Encadrements

Ta slovenski standard je istoveten z: **EN 12412-2:2003**

ICS:

91.060.50	Vrata in okna	Doors and windows
91.120.10	Toplotna izolacija stavb	Thermal insulation

SIST EN 12412-2:2003 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12412-2

July 2003

ICS 91.060.50

English version

Thermal performance of windows, doors and shutters - Determination of thermal transmittance by hot box method - Part 2: Frames

Performance thermique des fenêtres, portes et fermetures - Détermination du coefficient de transmission thermique par la méthode de la boîte chaude - Partie 2: Encadrements

Wärmetechnisches Verhalten von Fenstern, Türen und Abschlüssen - Bestimmung des Wärmedurchgangskoeffizienten mittels des Heizkastenverfahrens - Teil 2: Rahmen

This European Standard was approved by CEN on 2 May 2003.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

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

Contents

Foreword

This document EN 12412-2:2003 has been prepared 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 January 2004, and conflicting national standards shall be withdrawn at the latest by January 2004.

This standard is one of a series of standards on calculation and measurement methods for the design and evaluation of the thermal performance of buildings and building components.

Annexes A and B are normative. Annex C is informative.

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

Introduction

The method given in this European Standard provides data on frames that can be used in calculations of the overall thermal performance of windows and doors according to EN ISO 10077-1, *Thermal performance of windows, doors and shutters – Calculation of thermal transmittance – Part 1: Simplified method (ISO 10077-1).*

1 Scope

This European Standard specifies a method, based on EN ISO 8990 and EN ISO 12567-1, to measure the thermal transmittance of frame and sash components of windows and doors, including mullions and transoms.

The thermal bridging effect of window or door components (handles, hinges, closing devices, etc.) is included.

The test procedure is designed to take into account the whole developed area of the frame or sash surface, but excludes the influence of the thermal bridge introduced through the spacer in sealed glazing units.

Edge effects occurring outside of the perimeter of the specimen are excluded. Furthermore, energy transfer due to solar radiation is not taken into account, and air leakage is excluded.

The measurements are performed under defined conditions to facilitate the comparison of measured values.

Information on the design of the calibration transfer standard is given in EN ISO 12567-1.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1946-4, *Thermal performance of building products and components – Specific criteria for the assessment of laboratories measuring heat transfer properties – Part 4: Measurements by hot box methods.*

prEN 12519:1996, *Windows and doors – Terminology.*

EN 12664, *Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Dry and moist products of medium and low thermal resistance.*

EN ISO 7345:1995, *Thermal insulation – Physical quantities and definitions (ISO 7345:1987).*

EN ISO 8990:1996, *Thermal insulation – Determination of steady-state thermal transmission properties – Calibrated and guarded hot box (ISO 8990:1994).*

EN ISO 9288:1996, *Thermal insulation – Heat transfer by radiation – Physical quantities and definitions (ISO 9288:1989).*

EN ISO 12567-1:2000, *Thermal performance of windows and doors – Determination of thermal transmittance by hot box method - Part 1: Complete windows and doors (ISO 12567-1:2000).*

3 Terms, definitions, symbols, units and subscripts

3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in prEN 12519:1996, EN ISO 7345:1995, EN ISO 8990:1996 and EN ISO 9288:1996 apply.

3.2 Symbols and units

Symbol	Quantity	Unit
A	area	m^2
d	thickness or depth	m
F	fraction	–
f	view factor	–
H	height	m
h	surface coefficient of heat transfer	$W/(m^2 \cdot K)$
L	perimeter length	m
l	length	m
q	density of heat flow rate	W/m^2
R	thermal resistance	$m^2 \cdot K/W$
T	thermodynamic temperature	K
ΔT, $\Delta\theta$	temperature difference	K
U	thermal transmittance	$W/(m^2 \cdot K)$
v	air velocity	m/s
w	width	m
α	radiation factor	–
ε	hemispherical emissivity	–
θ	Celsius temperature	°C
Λ	thermal conductance	$W/(m^2 \cdot K)$
λ	thermal conductivity	$W/(m \cdot K)$
σ	Stefan-Boltzmann constant	$W/(m^2 \cdot K^4)$
Φ	heat flow rate	W
Ψ	linear thermal transmittance	$W/(m \cdot K)$

3.3 Subscripts

b	baffle
c	convection (air)
ca	calibration
e	external, usually cold side
ed	edge zone
f	frame
fi	infill with known thermal properties

hb	hot box
i	internal, usually warm side
in	input
m	measured
me	average/mean
n	environmental (ambient)
ne	environmental (ambient external)
ni	environmental (ambient internal)
p	reveal of surround panel
r	radiation (mean)
s	surface
sp	specimen
sur	surround panel
t	total

4 Principle

The thermal transmittance of a frame is determined directly by measurement under standardised conditions using the calibrated or guarded hot box method according to EN ISO 8990 and EN ISO 12567-1. The requirements of EN ISO 8990 shall be complied with in addition to those given in this standard. The method may be applied to complete window or door frames (see 5.3.1) or to profile sections including mullions, transoms etc. (see 5.3.2).

The surround panel is used to keep the specimen in a given position. It is constructed with outer dimensions of appropriate size for the apparatus, having an aperture to accommodate the specimen (see Figures 1 to 5).

The principal heat flows through the surround panel and the calibration panel (or test specimen) are shown in Figure 8. The boundary edge heat flow due to the location of the calibration panel in the surround panel is determined separately as a linear thermal transmittance, Ψ.

The procedure in this standard includes a correction for the boundary edge heat flow, so that standardized and reproducible thermal transmittance properties are obtained.

The magnitude of the boundary edge heat flow as a function of geometry, calibration panel thickness and thermal conductivity is determined by tabulated values given EN ISO 12567-1:2000, annex B.

5 Requirements for test specimen and apparatus

5.1 General

The test apparatus shall conform to the requirements specified in EN 1946-4, EN ISO 8990 and EN ISO 12567-1.

5.2 Surround panels

For details see EN ISO 12567-1:2000, 5.2.

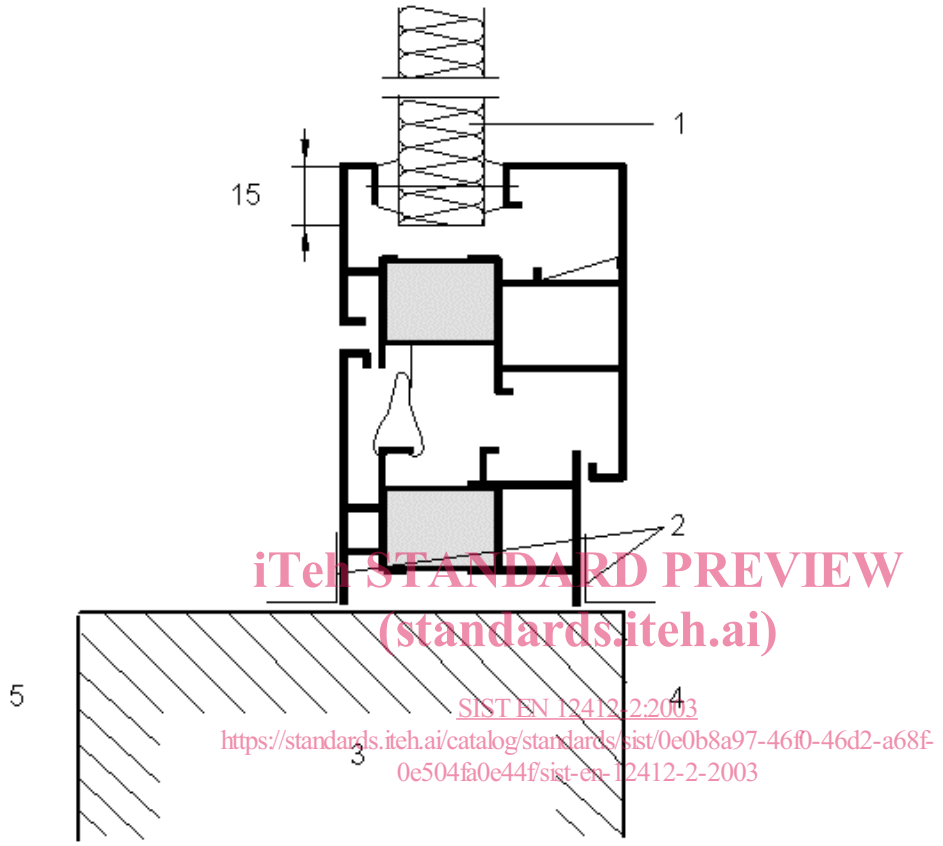
5.3 Specimen requirements and location

5.3.1 Complete frames for windows and doors

Specimen sizes should be representative (typical) of those found in practice. For standardised tests on window frames the overall sizes recommended are 1230 mm (width) by 1480 mm (height). Further requirements are laid down in EN ISO 12567-1:2000, 5.3.

To ensure consistency of measurement, the specimen shall be located as follows. The specimen with panel shall fill the surround panel aperture, which shall be located centrally. The internal frame face shall be as close to the face of the surround panel as possible, but no part shall project beyond the surround panel faces on either the cold or warm sides (see Figures 1, 2 and 3).

Dimensions in millimetres

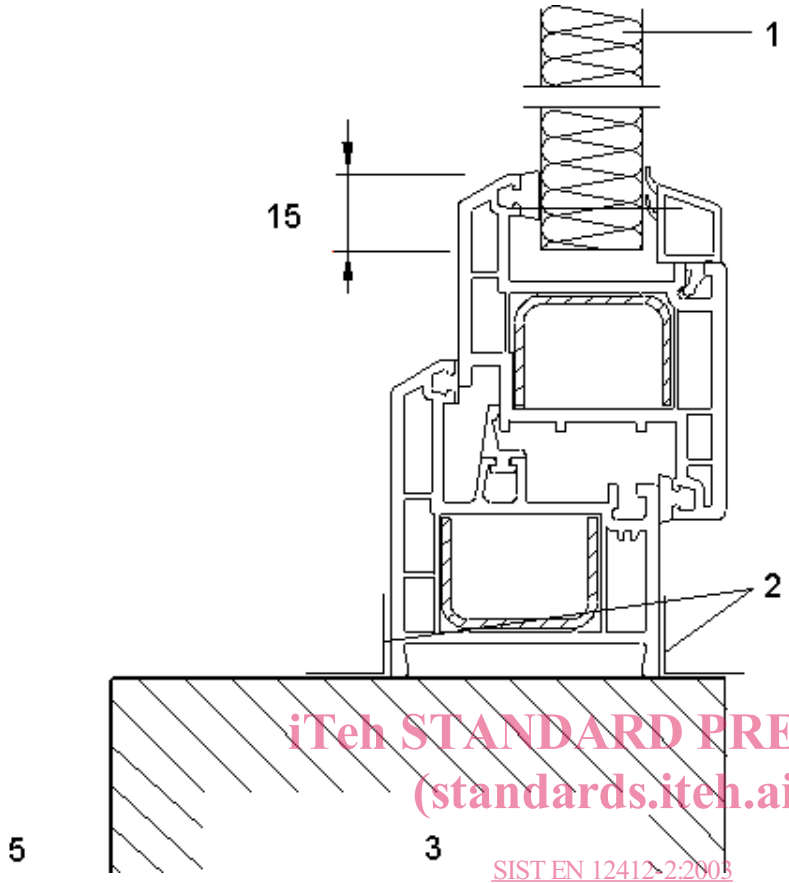


Key

1 Infill element of insulating material
2 Adhesive tape
3 Aperture
4 Warm side
5 Cold side

Figure 1 — Mounting of specimen in the aperture – Metal frame

Dimensions in millimetres

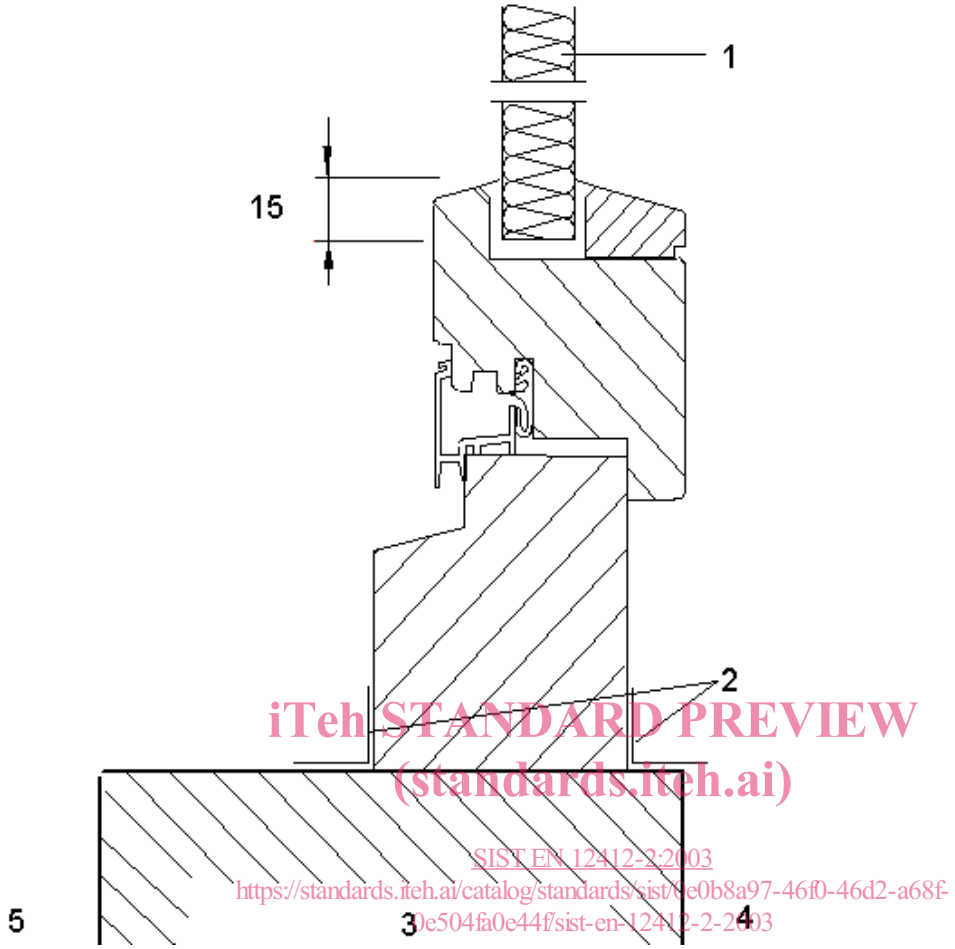


Key

1 Infill element of insulating material
2 Adhesive tape
3 Aperture
4 Warm side
5 Cold side

Figure 2 — Mounting of specimen in the aperture – PVC frame

Dimensions in millimetres



Key

1 Infill element of insulating material
2 Adhesive tape
3 Aperture
4 Warm side
5 Cold side

Figure 3 — Mounting of the specimen in the aperture – Wood frame

The aperture should be at least 200 mm from the inside surfaces of the cold and hot boxes to avoid or limit edge heat flow corrections, and to allow room for the guarded hot box (where applicable).

Any glazing or opaque infill panels in windows and doors shall be replaced by insulating panels (see Figures 1, 2 and 3). Thermocouples to measure the surface temperature on the infill insulation shall be placed as shown in Figure 6.

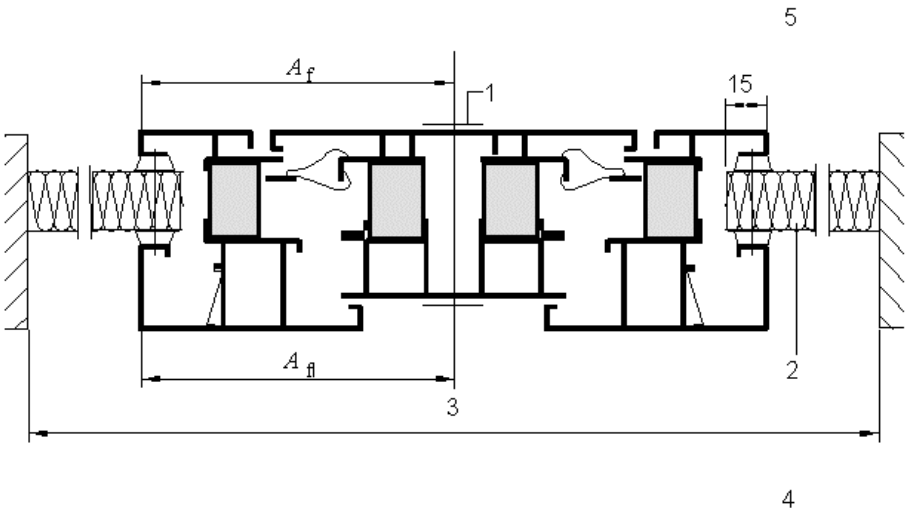
All surround panel thermocouples should be located centrally (see Figure 6).

For further information see EN ISO 12567-1.

5.3.2 Frame and sash, transom or mullion profile sections

The frame, mullion or transom of a window or door system shall be installed vertically in the surround panel aperture. The internal specimen face shall be as close to the face of the surround panel as possible, but no part shall project beyond the surround panel faces on either the cold or warm sides (see Figure 4).

Dimensions in millimetres



Key

1 Adhesive tape
2 Infill element of insulating material
3 Projected area A_t of the frame and infill insulation
4 Warm side
5 Cold side

Figure 4 – Combination of sashes and frames

The frame area, A_f, is the larger of the two projected areas seen from both sides.

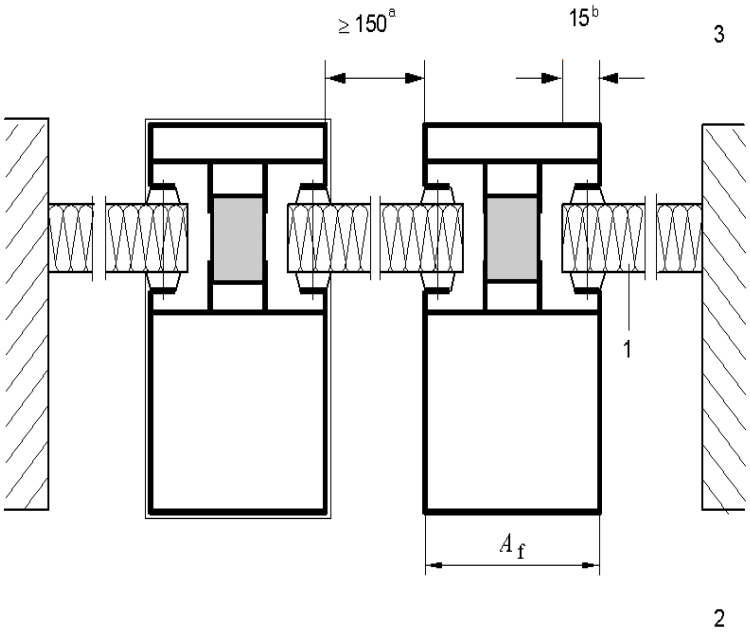
The length of the profile sections should be 1480 mm.

If the specimens usually form part of a combination of several frame profiles, e.g. sash and frame, the complete units shall be tested, inclusive of any hinges, seals, etc.

The sash and frame profile sections shall be connected with at least two hinges. Additionally, the profile sections shall be fixed without causing thermal bridging.

If the frame area forms less than 30 % of the aperture area of the hot box, two or more frames shall be installed so that the total frame area is at least 30 % of the aperture area, with a recommended distance between profile sections of 150 mm (see Figure 5).

Dimensions in millimetres



Key

1 Infill insulation
2 Warm side
3 Cold side
a Recommended dimension
b The extent of penetration of the infill insulation may be smaller than 15 mm only if the design does not allow 15 mm; in that case the actual penetration depth shall be stated in the test report

Figure 5 — Installation of more than one frame section in the aperture

The connection of frame and insulating panels, and the joining of frames, are shown in Figures 4 and 5.

The surface of specimens shall be treated as for the normal application of the product.

The area remaining between the aperture of the hot box and the specimen shall be filled with an infill insulation with known thermal conductivity. The thermal conductivity should not be higher than 0,035 W/(m·K).

The thermal conductivity of the infill insulation shall be obtained by measurement according to EN 12664 (guarded hot plate apparatus) or by using materials with certified properties from an accredited source.

Thermocouples to measure the surface temperature shall be centrally located as shown in Figure 7.

For further information see EN ISO 12567-1.

5.4 Calibration panels

The calibration panel shall be mounted as shown in Figure 8. For further details see 5.5 and EN ISO 12567-1:2000, 5.4.

5.5 Temperature measurement and baffle positions

For details see EN ISO 12567-1:2000, 5.6.