SLOVENSKI STANDARD
oSIST prEN ISO 12631:2011

01-februar-2011

Toplotne značilnosti obešenih fasad - Izračun toplotne prehodnosti (ISO/DIS 12631:2010)

Thermal performance of curtain walling - Calculation of thermal transmittance (ISO/DIS 12631:2010)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Wärmetechnisches Verhalten von Vorhangfassaden - Berechnung des Wärmedurchgangskoeffizienten (ISO/DIS 12631:2010)

Performance thermique des façades-rideaux - Calcul du coefficient de transmission thermique (ISO/DIS 12631:2010)

SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

Ta slovenski standard je istoveten z: **prEN ISO 12631**

ICS:

91.060.10	Stene. Predelne stene. Fasade	Walls. Partitions. Facades
91.120.10	Toplotna izolacija stavb	Thermal insulation

oSIST prEN ISO 12631:2011 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

oSIST prEN ISO 12631:2011

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

oSIST prEN ISO 12631:2011

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN ISO 12631

November 2010

ICS 91.120.10

Will supersede EN 13947:2006

English Version

Thermal performance of curtain walling - Calculation of thermal transmittance (ISO/DIS 12631:2010)

Performance thermique des façades-rideaux - Calcul du coefficient de transmission thermique (ISO/DIS 12631:2010)

Wärmetechnisches Verhalten von Vorhangfassaden - Berechnung des Wärmedurchgangskoeffizienten (ISO/DIS 12631:2010)

This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 89.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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.

SIST-EN-ISO-12631-2013
https://standards.iteh.ai/catalog/standards/sist/aba7cbf97ab8/sist-en-iso-12631-2013

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

© 2010 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

oSIST prEN ISO 12631:2011

Contents

Page

Foreword.....3

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

oSIST prEN ISO 12631:2011

Foreword

This document (prEN ISO 12631:2010) has been prepared by Technical Committee CEN/TC 89 “Thermal performance of buildings and building components”, the secretariat of which is held by SIS, in collaboration with Technical Committee ISO/TC 163 "Thermal performance and energy use in the built environment".

This document is currently submitted to the parallel Enquiry.

This document will supersede EN 13947:2006.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

oSIST prEN ISO 12631:2011

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

oSIST prEN ISO 12631:2011

DRAFT INTERNATIONAL STANDARD ISO/DIS 12631

ISO/TC **163**/SC **2** Secretariat: **SN**

Voting begins on: **2010-11-04**

Voting terminates on: **2011-04-04**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Thermal performance of curtain walling — Calculation of thermal transmittance

Performance thermique des façades-rideaux — Calcul du coefficient de transmission thermique

ICS 91.120.10

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the European Committee for Standardization (CEN), and processed under the **CEN-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

In accordance with the provisions of Council Resolution 15/1993 this document is circulated in the English language only.

Conformément aux dispositions de la Résolution du Conseil 15/1993, ce document est distribué en version anglaise seulement.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

© International Organization for Standardization, 2010

oSIST prEN ISO 12631:2011

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

Copyright notice

This ISO document is a Draft International Standard and is copyright-protected by ISO. Except as permitted under the applicable laws of the user's country, neither this ISO draft nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured.

Requests for permission to reproduce should be addressed to 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

Reproduction may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.

© ISO 2010 – All rights reserved

oSIST prEN ISO 12631:2011

Contents

Page

Foreword v

Introduction v

1 Scope 1

2 Normative references 1

3 Terms and definitions, symbols and units 2
3.1 Terms and definitions 2
3.2 Symbols and units 2
3.3 Subscripts 2
3.4 Superscripts 3

4 Geometrical characteristics 3
4.1 Main principles 3
4.2 Developed areas and internal depth 6
4.3 Boundaries of curtain wall structures 6
4.3.1 6
4.3.2 Boundaries of a representative reference element 7
4.3.3 Curtain wall areas 8

5 Cut-off planes and partitioning of thermal zones 9
5.1 Rules for thermal modelling 9
5.2 Cut-off planes of the geometrical model 9

6 Calculation of curtain wall transmittance 9
6.1 Methodologies 9
6.2 Single assessment method 10
6.2.1 Thermal transmittance of glazing units and panels (filling elements) 10
6.2.2 Determination of the heat flow through filling element / mullion or transom / filling element connection 10
6.2.3 Determination of the overall thermal transmittance of a curtain wall (U_{CW}) 15
6.3 Component assessment method 16
6.3.1 General 16
6.3.2 Definition of areas 16
6.3.3 Thermal transmittance of glazing units and panels (filling elements) 19
6.3.4 Thermal transmittance of frames, mullions and transoms 19
6.3.5 Linear thermal transmittance 20
6.4 Thermal transmittance of a curtain wall built of different elements 22

7 Input data 22

8 Report 23
8.1 Section drawings 23
8.2 Overview drawing of the whole curtain wall element 23
8.3 Values used for calculation 23
8.4 Presentation of results 23

Annex A (informative) **Guidance for calculating the thermal transmittance U_{CW} of curtain walling using the two methods** 24

Annex B (informative) **Linear thermal transmittance of junctions** 25

Annex C (normative) **A method for calculating the thermal effect of screws using a 2D numerical method and the procedures specified in ISO 10077-2** 33
C.1 General 33

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-

© ISO 2010 – All rights reserved

oSIST prEN ISO 12631:2011

C.2 Calculation of the equivalent thermal conductivity of the screw $\lambda_{s,eq}$ 34
C.3 Consideration of screw heads and washers 36

Annex D (normative) Ventilated and unventilated air spaces 37

Annex E (informative) Component method: Calculation example 40
E.1 Data for examples 40
E.2 Frames 42
E.2.1 Definition and evaluation of areas 42
E.2.2 Evaluation of U_f values 43
E.3 Glazing units 43
E.3.1 Definition and evaluation of areas 43
E.3.2 Evaluation of U_g values 43
E.3.3 Definition of l_g and evaluation of Ψ_g, $\Psi_{m,f}$ and $\Psi_{t,f}$ 43
E.4 Panels 44
E.4.1 Definition and evaluation of areas 44
E.4.2 Evaluation of U_p values 44
E.4.3 Definition of l_p and evaluation of the Ψ_p values 44
E.4.4 Calculation of a complete element 45

Annex F (informative) Single assessment method: Calculation example 46
F.1 General description of examples 46
F.2 Centre U-value of the glazing unit 47
F.3 Centre U-value of the spandrel panel 47
F.4 U-values of thermal joints 47
F.5 Overall U-value of the curtain wall 48

Bibliography 49

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

© ISO 2010 – All rights reserved

oSIST prEN ISO 12631:2011

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 12631 was prepared by Technical Committee CEN/TC 89, *Thermal performance of buildings and building components*, the secretariat of which is held by SIS in collaboration with 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).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This document is currently submitted to the parallel Enquiry.

SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

Introduction

The design and construction of curtain wall systems is complex. This standard specifies a procedure for calculating the thermal transmittance of curtain wall structures.

Curtain walls often contain different kinds of materials, joined in different ways, and can exhibit numerous variations of geometrical shape. With such a complex structure, the likelihood of producing thermal bridges across the curtain wall envelope is quite high.

The results of calculations, carried out following the procedures specified in this standard, can be used for comparison of the thermal transmittance of different types of curtain wall or as part of the input data for calculating the heat used in a building. This standard is not suitable for determining whether or not condensation will occur on the structure surfaces nor within the structure itself.

Two methods are given in this standard:

— single assessment method (see 6.2);

— component assessment method (see 6.3).

Guidance on the use of these two methods is given in Annex A. Calculation examples for these two methods are given in Annex E and Annex F.

Testing according to ISO 12567-1 is an alternative to this calculation method.

© ISO 2010 – All rights reserved

oSIST prEN ISO 12631:2011

The thermal effects of connections to the main building structure as well as fixing lugs can be calculated according to ISO 10211.

The thermal transmittance of the frame, U_f, is defined according to ISO 10077-2 or EN 12412-2 together with Annex A. The thermal transmittance of glazing units, U_g, is defined according to EN 673, EN 674 or EN 675 which do not include the edge effects. The thermal interaction of the frame and the filling element is included in the linear thermal transmittance Ψ which is derived using the procedures specified in ISO 10077-2.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

© ISO 2010 – All rights reserved

oSIST prEN ISO 12631:2011

Thermal performance of curtain walling — Calculation of thermal transmittance

1 Scope

This standard specifies a method for calculating the thermal transmittance of curtain walls consisting of glazed and/or opaque panels fitted in, or connected to, frames.

The calculation includes:

— different types of glazing, e.g. glass or plastic; single or multiple glazing; with or without low emissivity coating; with cavities filled with air or other gases;

— frames (of any material) with or without thermal breaks;

— different types of opaque panels clad with metal, glass, ceramics or any other material.

iTeh STANDARD PREVIEW

Thermal bridge effects at the rebate or connection between the glazed area, the frame area and the panel area are included in the calculation.

(standards.iteh.ai)

The calculation does not include:

SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

— effects of solar radiation;

— heat transfer caused by air leakage;

— calculation of condensation;

— effect of shutters;

— additional heat transfer at the corners and edges of the curtain walling;

— connections to the main building structure nor through fixing lugs;

— curtain wall systems with integrated heating.

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.

EN 673:1997, *Glass in building — Determination of thermal transmittance (U value) — Calculation method*

EN 674, *Glass in building — Determination of thermal transmittance (U value) — Guarded hot plate method*

EN 675, *Glass in building — Determination of thermal transmittance (U value) — Heat flow meter method*

© ISO 2010 – All rights reserved

oSIST prEN ISO 12631:2011

EN 12412-2, *Thermal performance of windows, doors and shutters — Determination of thermal transmittance by hot box method — Part 2: Frames*

ISO 6946:2007, *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

ISO 7345:1995, *Thermal insulation — Physical quantities and definitions*

ISO 10077-1:2006, *Thermal performance of windows, doors and shutters — Calculation of thermal transmittance — Part 1: General*

DIS 10077-2:2009, *Thermal performance of windows, doors and shutters — Calculation of thermal transmittance — Part 2: Numerical method for frames*

ISO 10211:2007, *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations*

ISO 12567-1:2000, *Thermal performance of windows and doors — Determination of thermal transmittance by hot box method — Part 1: Complete windows and doors*

3 Terms and definitions, symbols and units

3.1 Terms and definitions

iTeh STANDARD PREVIEW
(standards.iteh.ai)

For the purposes of this document, the terms and definitions given in EN 673:1997, ISO 7345:1995, ISO 6946:2007 and the following apply.

NOTE Clause 4 includes descriptions of a number of geometrical characteristics of glazing units, frame sections and panels.

SIST EN ISO 12631:2013
https://standards.iteh.ai/catalog/standards/sist/979e5274-8537-4492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

3.2 Symbols and units

Table 1 — Symbols and units

Symbol	Quantity	Unit
A	area	m^2
T	thermodynamic temperature	K
U	thermal transmittance	$W/(m^2 \cdot K)$
l	length	m
d	depth	m
Φ	heat flow rate	W
Ψ	linear thermal transmittance	$W/(m \cdot K)$
Δ	difference	
Σ	summation	
ε	emissivity	

3.3 Subscripts

cw curtain walling

d developed

e external

© ISO 2010 – All rights reserved

oSIST prEN ISO 12631:2011

eq equivalent
f frame
f,g frame/glazing
FE filling element
g glazing
i internal
j joint
m mullion
m,f mullion/frame
m,g mullion/glazing
n normal
p panel (opaque)
s screw
t transom
t,f transom/frame
t,g transom/glazing
tot total
TJ thermal joint at a connection between two filling elements
W window

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.4 Superscripts

SIST EN ISO 12631:2013

* definition of areas for length-related treatment of thermal joints (see 6.2.2.3)

https://standards.iteh.ai/catalog/standards/sist/[illegible]492-bda6-aba7cbf97ab8/sist-en-iso-12631-2013

4 Geometrical characteristics

4.1 Main principles

The main principles of curtain walling are shown in Figures 1 and 2.

© ISO 2010 – All rights reserved