INTERNATIONAL STANDARD

ISO 12631

First edition
2012-10-01

Thermal performance of curtain walling — Calculation of thermal transmittance

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

This document is a preview generated by EVS

Reference number
ISO 12631:2012(E)

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Published in Switzerland

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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 the European Committee for Standardization (CEN) Technical Committee CEN/TC 89, *Thermal performance of buildings and building components*, the secretariat of which is held by SIS, in collaboration with ISO Technical Committee 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).

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Introduction

The design and construction of curtain wall systems is complex. This International 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 International 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 International 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 international 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 12567-1:2010 is an alternative to this calculation method.

The thermal effects of connections to the main building structure as well as fixing lugs can be calculated according to ISO 10211:2007.

The thermal transmittance of the frame, U_f, is defined according to ISO 10077-2:2012 or EN 12412-2:2003 together with Annex A. The thermal transmittance of glazing units, U_g, is defined according to the documents listed in Table G.1 which does 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 10077-2:2012.

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Thermal performance of curtain walling — Calculation of thermal transmittance

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1 Scope

This International 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.

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

The calculation does not include:

— 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.

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

ISO 7345:1987, *Thermal insulation — Physical quantities and definitions*

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

ISO 10077-2:2012, *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 10291:1994, *Glass in building — Determination of steady-state U values (thermal transmittance) of multiple glazing - Guarded hot plate method*

ISO 10292:1994, *Glass in building — Calculation of steady-state U values (thermal transmittance) of multiple glazing*

ISO 10293:1997, *Glass in building — Determination of steady-state U values (thermal transmittance) of multiple glazing - Heat flow meter method*

ISO 12567-1:2010, *Thermal performance of windows and doors — Determination of thermal transmittance by hot box method — Part 1: Complete windows and doors*

EN 673:2011, *Glass in building — Determination of thermal transmittance (U value) — Calculation method*

EN 674:2011, *Glass in building — Determination of thermal transmittance (U value) — Guarded hot plate method*

EN 675:2011, *Glass in building — Determination of thermal transmittance (U value) — Heat flow meter method*

EN 12412-2:2003, *Thermal performance of windows, doors and shutters — Determination of thermal transmittance by hot-box method — Part 2: Frames*

3 Terms, definitions, symbols and units

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345:1987, ISO 6946:2007 and Annex G apply.

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

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