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Thermal performance of windows and doors — Determination of solar heat gain coefficient using solar simulator

Performance thermique des fenêtres et portes — Détermination du coefficient de gain thermique solaire au moyen d'un simulateur solaire

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Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **2**

4 Symbols and subscripts ... **2**

5 Principle ... **3**
5.1 General ... 3
5.2 Measurement of heat flow rates with irradiance ... 3
5.3 Determination of the net density of heat flow rate due to thermal transmission ... 5
5.4 Measurement of heat flow rates without irradiance ... 6

6 Test apparatus and specimens ... **8**
6.1 Construction and summary of the test apparatus ... 8
6.1.1 Construction of the test apparatus ... 8
6.1.2 Summary of the test apparatus ... 9
6.2 Solar simulator ... 9
6.3 Climatic chamber ... 10
6.4 Metering box ... 10
6.5 Surround panels ... 11
6.6 Calibration panels ... 11
6.7 Metering location of temperatures and irradiance ... 11
6.8 Test specimens ... 12

7 Measurement procedure ... **12**
7.1 Measurement ... 12
7.2 Expression of results for reference conditions ... 13

8 Test report ... **13**
8.1 Report contents ... 13
8.2 Estimation of uncertainty ... 14

Annex A (normative) **Determination of surface coefficient of heat transfer** ... **15**

Annex B (normative) **Determination of night time *U*-value in case of small temperature difference** ... **17**

Annex C (normative) **Correction of measured solar heat gain coefficient to reference conditions** **18**

Annex D (informative) **Examples of design of measuring apparatus** ... **30**

Annex E (informative) **Example of temperature measurement** ... **39**

Annex F (informative) **Measuring method and example of measurement of active solar fenestration systems** ... **42**

Annex G (informative) **Example of measurement and uncertainty analysis** ... **44**

Annex H (informative) **Spectral weighting procedures based on ISO 9050 and with analogous solar simulator spectra** ... **47**

Bibliography ... **52**

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment,* Subcommittee SC 1, *Test and measurement methods*.

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Introduction

The terms solar heat gain coefficient (SHGC), total solar energy transmittance (TSET), solar factor and g-value are all used to describe the same quantity. Small differences might be caused by different reference conditions (e.g. differences in the reference solar spectrum). In this document, solar heat gain coefficient is used.

This document is designed to provide solar heat gain coefficient values by standardized measurement method and to enable a fair comparison of different products. It specifies standardized apparatus and criteria. The solar heat gain coefficient measuring apparatus applied in this document includes solar simulator, climatic chamber, and metering box. Solar heat gain coefficient values of windows and doors with or without shading devices shall be determined more precisely by means of combination between calculation and measurement.

This document does not deal with the centre of glazing solar heat gain coefficient measurement. However, the centre of glazing solar heat gain coefficient can be measured by either this method or cooled plate method (see Reference [12]).

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Thermal performance of windows and doors — Determination of solar heat gain coefficient using solar simulator

1 Scope

This document specifies a method to measure the solar heat gain coefficient of complete windows and doors.

This document applies to windows and doors

a) with various types of glazing (glass or plastic; single or multiple glazing; with or without low emissivity coatings, and with spaces filled with air or other gases),

b) with opaque panels,

c) with various types of frames (wood, plastic, metallic with and without thermal barrier or any combination of materials),

d) with various types of shading devices (blind, screen, film or any attachment with shading effects),

e) with various types of active solar fenestration systems [building-integrated PV systems (BIPV) or building-integrated solar thermal collectors (BIST)].

This document does not include the following:

a) shading effects of building elements (e.g. eaves, sleeve wall, etc.);

b) heat transfer caused by air leakage between indoors and outdoors;

c) ventilation of air spaces in double and coupled windows;

d) thermal bridge effects at the rebate or joint between the window or door frame and the rest of the building envelope.

This document does not apply to the following:

a) non-vertical windows;

b) curtain walls;

c) industrial, commercial and garage doors.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 9050, *Glass in building — Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors*

ISO 9845-1, *Solar energy — Reference solar spectral irradiance at the ground at different receiving conditions — Part 1: Direct normal and hemispherical solar irradiance for air mass 1,5*

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

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ISO 15099:2003, *Thermal performance of windows, doors and shading devices — Detailed calculations*

ISO 52022-3[1)], *Energy performance of buildings — Thermal, solar and daylight properties of building components and elements — Part 3: Detailed calculation method of the solar and daylight characteristics for solar protection devices combined with glazing*

IEC 60904-9, *Photovoltaic devices — Part 9: Solar simulator performance requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345, ISO 8990, ISO 9288, ISO 9845-1, ISO 12567-1, ISO 15099 and IEC 60904-9 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Symbols and subscripts

Symbol	Quantity	Unit
A	Area	m^2
g	Solar heat gain coefficient (also known as total solar energy transmittance, solar factor or g-value)	—
h	Surface coefficient of heat transfer	$W/(m^2 \cdot K)$
H	Height	m
I	Irradiance, density of heat flow rate of incident radiation (energy per unit area per unit time resulting from incident radiation)	W/m^2
q	Density of heat flow rate (energy per unit area per unit time resulting from radiative and/or convective and/or conductive heat transfer)	W/m^2
U	Thermal transmittance	$W/(m^2 \cdot K)$
W	Width	m
θ	Celsius temperature	°C
Φ	Heat flow rate (energy per unit time resulting from radiative and/or convective and/or conductive heat transfer)	W

Subscripts	Significance
B	Planes of peripheral wall of the metering box
C	Cooling device
ex	External
F	Internal fan
g	Glazing
H	Heating device
in	Internal
m	Measured
N	Without irradiance
ne	Environmental external

1) To be published.

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