
**Glass in building — Determination of
energy balance value — Calculation
method**

*Verre dans la construction — Détermination de la valeur du bilan
énergétique — Méthode de calcul*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 14438:2002](https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002)

[https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-
a2b436817e99/iso-14438-2002](https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002)



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)

ISO 14438:2002

<https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002>

© ISO 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from 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.ch
Web www.iso.ch

Printed in Switzerland

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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14438 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 160, *Glass in building*, Subcommittee SC 2, *Use considerations*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "this European Standard..." to mean "...this International Standard...".

Annexes A and B of this International Standard are for information only.

[ISO 14438:2002](https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002)

<https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002>

Contents

| | page |
|---|------|
| Foreword..... | v |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Symbols | 1 |
| 4 Basic formula..... | 2 |
| 5 Basic material properties..... | 2 |
| 6 Solar radiation incident, H_p | 3 |
| 7 Degree day data, D_p | 3 |
| 8 Period of application, p | 3 |
| 9 Principal values and presentation..... | 3 |
| 10 Alternative simplification of principal values and presentation | 4 |
| Annex A (informative) Examples of climatic data p , D_p and H_p | 5 |
| Annex B (informative) Examples of calculation of the energy balance value | 6 |
| Bibliography | 8 |

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 14438:2002

<https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002>

Foreword

This document (EN ISO 14438:2002) has been prepared by Technical Committee CEN/TC 129 "Glass in building", the secretariat of which is held by IBN, in collaboration with Technical Committee ISO/TC 160 "Glass in building".

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 December 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

A first Formal Vote took place within CEN as prEN 14026 between 2000-10-19 and 2000-12-19.

Annexes A and B are informative.

This standard includes a Bibliography.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 14438:2002](https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002)

<https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 14438:2002

<https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002>

1 Scope

This European Standard specifies a calculation method to determine the energy balance value of glazing. This European Standard applies to transparent materials such as glass and combinations of glass used to glaze windows in buildings.

This method is intended to evaluate the balance of heat loss and useful heat gain by solar radiation entering the building through the glazing for a given period by means of an average rate of loss (or gain) of heat called the energy balance value.

The method enables producers to compare the performance of their glazing products. The energy balance value should not be used for energy use or heating capacity calculations in buildings.

2 Normative references

This European Standard incorporates by dated or undated references, 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 410 | Glass in building - Determination of luminous and solar characteristics of glazing |
| EN 673 | 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 |
| EN 832 | Thermal performance of buildings - Calculation of energy use for heating - Residential buildings |

3 Symbols

ISO 14438:2002
<https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002>

| | | |
|------------|---|-----------------------|
| D | degree days | K·24 h |
| η | utility factor | |
| H | unobstructed incident solar radiation | kWh/m ² |
| g | total solar energy transmittance (solar factor) | |
| U | thermal transmittance (U value) | W/(m ² ·K) |
| f | factor due to glazing maintenance and shadow effects | |
| S | function of H and D characterising a given region | W/(m ² ·K) |
| E | energy balance value | W/(m ² ·K) |
| Subscripts | | |
| p | period of application | |

4 Basic formula

The energy balance value, E , for a given period is calculated according to the following equation:

$$E = U - \frac{\eta \cdot g \cdot f \cdot H_p}{D_p} \quad (1)$$

where:

U is the U value of the glazing;

η is the utility factor;

f is the factor due to glazing maintenance and shadow effects;

g is the glazing total solar energy transmittance (solar factor);

H_p is the unobstructed incident solar radiation during the given period;

D_p is the degree day total for the given period.

NOTE An example of calculation is given in annex B.

5 Basic material properties

5.1 U Value (thermal transmittance)

The U value of the glazing is determined by calculation, in accordance with EN 673 or measurement in accordance with EN 674 or EN 675.

5.2 Utility factor, η

<https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082-a2b436817e99/iso-14438-2002>

The utility factor for a building or space in a building is the ratio of the useful heat gains, which displace the functional heating over a defined period, to the total heat gains during the period.

The utility factor is essentially a property of the building design.

The utility factor cannot exceed unity. Its precise value depends on the ability of the building and the control of its heating systems to displace its functional heating load while maintaining desirable temperatures inside.

The utility factor is dependent on the period chosen and the length of the period.

Its value for typical constructions such as windows in buildings lies between 0,4 and 0,8 for the winter heating period and it can be determined experimentally or by calculation in accordance with EN 832. For purposes of comparison of glazing products a utility factor of 0,6 shall be used.

5.3 Glazing total solar energy transmittance (solar factor), g

This is the total transmission of solar heat through the glazing, and is the sum of the direct transmittance of solar radiation and the amount of absorbed radiation which is convected and re-radiated to the interior.

The total solar energy transmittance shall be determined in accordance with EN 410.

5.4 Factor due to glazing maintenance and shadow effects, f

This factor is an allowance for accumulated dirt on the glazing surface and shading effects. For vertical or near vertical ($\pm 15^\circ$) surfaces the value 0,8 shall be used for comparison of glazing products.

6 Solar radiation incident, H_p

The amount of unobstructed solar radiation is described by the factor H_p which is the amount of solar radiation in kWh/m² incident upon the vertical glazing surface during the whole period under consideration.

Data for selected sites are exemplified in annex A.

NOTE Data for sites in Europe are found in [1] of Bibliography.

7 Degree day data, D_p

Degree day units are computed as the difference between the base temperature and the daily average outside temperature. One unit is accumulated for each degree kelvin the average temperature is below the base temperature. Negative values are discarded. This is done for each day of the heating period and summed.

Degree day data are calculated for the local national conditions. Official statistics are published in most countries. The base temperature is the internal design control temperature and shall be defined for the period under consideration. For purposes of comparison a base temperature of 18°C shall be used.

The value used in the equation shall be the total number of degree days (in kelvins · 24 h) for the period under consideration. Examples are given in annex A.

8 Period of application, p

The method of this standard may be used for evaluating the energy balance value of glazing for any chosen period.

For purposes of comparison the period is the "heating season", i.e. the whole period in the months during which functional heating is used in the building. Examples are given in annex A.

9 Principal values and presentation ISO 14438:2002

<https://standards.iteh.ai/catalog/standards/sist/70bb4023-2446-4f01-8082->

For the evaluation of the energy balance value (E) of glazing which is used for comparative purposes identical underlying assumptions shall be made.

All the underlying assumptions shall be stated and data prescribed in this standard shall be used.

Statement of underlying assumptions:

- location of use;
- orientation of glazing;
- source of degree day data.

If values of the utility factor and glazing maintenance factor different from 0,6 and 0,8 respectively are used for purposes other than for comparison of products, this shall be stated.

Any publication of energy balance value shall be accompanied by a statement, that the evaluation is based on the full potential incident solar radiation. Any external obstruction which overshadows the window tends to increase the energy balance value. Therefore, in addition to a statement of the underlying assumptions the following complementary statement shall be made:

"This evaluation is applicable only for unobstructed glazing".

The energy balance value shall be expressed in W/(m²·K) rounded to one decimal figure. If the second decimal is five, it shall be rounded to the higher values.