SLOVENSKI STANDARD
SIST EN 14500:2021

01-julij-2021

Nadomešča:
SIST EN 14500:2008

Rolete in polkna - Toplotno in vizualno ugodje - Preskus in računske metode

Blinds and shutters - Thermal and visual comfort - Test and calculation methods

Abschlüsse - Thermischer und visueller Komfort - Prüf- und Berechungsverfahren

Fermetures et stores - Confort thermique et lumineux - Méthodes d'essai et de calcul

Ta slovenski standard je istoveten z: **EN 14500:2021**

ICS:

91.060.50	Vrata in okna	Doors and windows

SIST EN 14500:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14500

March 2021

ICS 91.060.50

Supersedes EN 14500:2008

English Version

Blinds and shutters - Thermal and visual comfort - Test and calculation methods

Fermetures et stores - Confort thermique et lumineux - Méthodes d'essai et de calcul

Abschlüsse - Thermischer und visueller Komfort - Prüf- und Berechungsverfahren

This European Standard was approved by CEN on 21 October 2019.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (EN 14500:2021) has been prepared by Technical Committee CEN/TC 33 “Doors, windows, shutters, building hardware and curtain walling”, the secretariat of which is held by AFNOR.

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 September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14500:2008.

The main modifications of this project of revision are relating to:

— the improvement of the method for the determination of the optical properties with an integrating sphere. The major improvement concerns the consideration of samples with scattering properties (critical samples). This implied the definition of specific requirements relating to the geometry of the test equipment and a methodology to identify if a sample is critical or not;

— the addition of a new method for the determination of the optical properties from direct measurement (without integrating sphere);

— the addition of a method for the determination of the cut-off angle;

— the improvement of the method for the determination of the darkening performance of curtain materials and complete products, including a method to qualify both the test equipment and the observer.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document is part of a series of standards dealing with blinds and shutters for buildings as defined in EN 12216.

1 Scope

This document defines test and calculation methods for the determination of the reflection and transmission characteristics to be used to determine the thermal and visual comfort performance classes of external blinds, internal blinds and shutters, as specified in EN 14501:2021.

This document also specifies the method to determine the darkening performance of external blinds, internal blinds and shutters, as specified in EN 14501:2021.

This document applies to the whole range of shutters, awnings and blinds defined in EN 12216, described as solar protection devices in this document. Some of the characteristics (e.g. g_{tot}) are not applicable when products are not parallel to the glazing (e.g. folding-arm awnings).

NOTE 1 Informative Annex D presents an approach for the determination of characteristics in case of projectable products.

Retro-reflecting products are outside the scope of this document for reflectance measurements.

NOTE 2 Retro-reflecting products refer to products for which the reflected radiation comes back to the light source in the same direction.

Products using a significant amount of fluorescent are outside the scope of this document.

NOTE 3 "Significant amount" refers to materials which are designed to be fluorescent or retroreflective and marketed as such. It does not refer to trace amounts of materials exhibiting fluorescence, e.g. for colour or identification purposes. Small amounts of materials such as titanium dioxide, which are not primarily included to achieve fluorescence, can be present.

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.

EN 410, *Glass in building — Determination of luminous and solar characteristics of glazing*

EN 12216, *Shutters, external blinds, internal blinds — Terminology, glossary and definitions*

EN 14501:2021, *Blinds and shutters — Thermal and visual comfort — Performance characteristics and classification*

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

EN ISO 52022-3:2017, *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 (ISO 52022-3:2017)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12216, EN 14501:2021 and the following 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 https://www.iso.org/obp

3.1 Processes

3.1.1
reflection
process by which radiation is returned by a surface or medium, without change of frequency of its monochromatic components

The following sub-processes are defined herewith:

— specular (or directional or regular) reflection: reflection in accordance with the laws of geometrical optics, without diffusion;

— diffuse reflection: reflection due to light scattering, in which, on the macroscopic scale, there is no specular reflection;

— isotropic diffuse reflection: diffuse reflection in which the spatial distribution of the reflected radiation is such that the radiance or luminance is the same in all directions in the hemisphere into which the radiation is reflected

3.1.2
transmission
passage of radiation through a medium without change of frequency of its monochromatic components

The following sub-processes are defined herewith:

— directional (or direct-direct) transmission: transmission in accordance with the laws of geometrical optics, without diffusion or redirection;

— diffuse transmission: transmission due to light scattering, in which, on the macroscopic scale, there is no direct transmission;

— isotropic diffuse transmission: diffuse transmission in which the spatial distribution of the transmitted radiation is such that the radiance or luminance is the same in all directions in the hemisphere into which the radiation is transmitted

3.1.3
absorption
process by which radiant energy is converted to a different form of energy (e.g. heat) by interaction with matter

3.2 Characteristics

3.2.1
reflectance
ρ
ratio of the reflected flux to the incident flux

The following sub-characteristics are defined:

— directional-directional (or direct-direct) reflectance: ratio of the specularly reflected flux to the directional incident flux;

— directional-diffuse reflectance: ratio of the diffusely reflected flux to the directional incident flux;

— directional-hemispherical (or total) reflectance: ratio of the total reflected flux to the directional incident flux;

— diffuse-hemispherical reflectance: ratio of the total reflected flux to the ideally diffuse incident flux. Ideally diffuse irradiation means that the radiance or the luminance is equal for the whole hemisphere of the incident irradiation

3.2.2
transmittance
τ
ratio of the transmitted flux to the incident flux

The following sub-characteristics are defined:

— directional-directional transmittance: ratio of the directly transmitted flux to the directional incident flux;

— directional-diffuse transmittance: ratio of the diffusely transmitted flux to the directional incident flux;

— directional-hemispherical transmittance: ratio of the total transmitted flux to the directional incident flux;

— diffuse-hemispherical transmittance: ratio of the total transmitted flux to the ideally diffuse incident flux. Ideally diffuse irradiation means that the radiance or the luminance is equal for the whole hemisphere of the incident irradiation

3.2.3
absorptance
α
ratio of the absorbed flux to the incident flux

3.3 Angle definitions

All the following angles are defined in a coordinate system which is fixed relative to the orientation of the solar protection device.

3.3.1
angle of incidence
θ
angle between the normal to the plane of the solar protection device and the direction of the incident radiation

Note 1 to entry: See Figure 1.

3.3.2
altitude angle
α_s
projection of the angle of incidence on the vertical plane which contains the direction of the incident radiation

Note 1 to entry: See Figure 1.

3.3.3
azimuth angle
γ
projection of the angle of incidence on a plane which is normal to the plane of the solar protection device

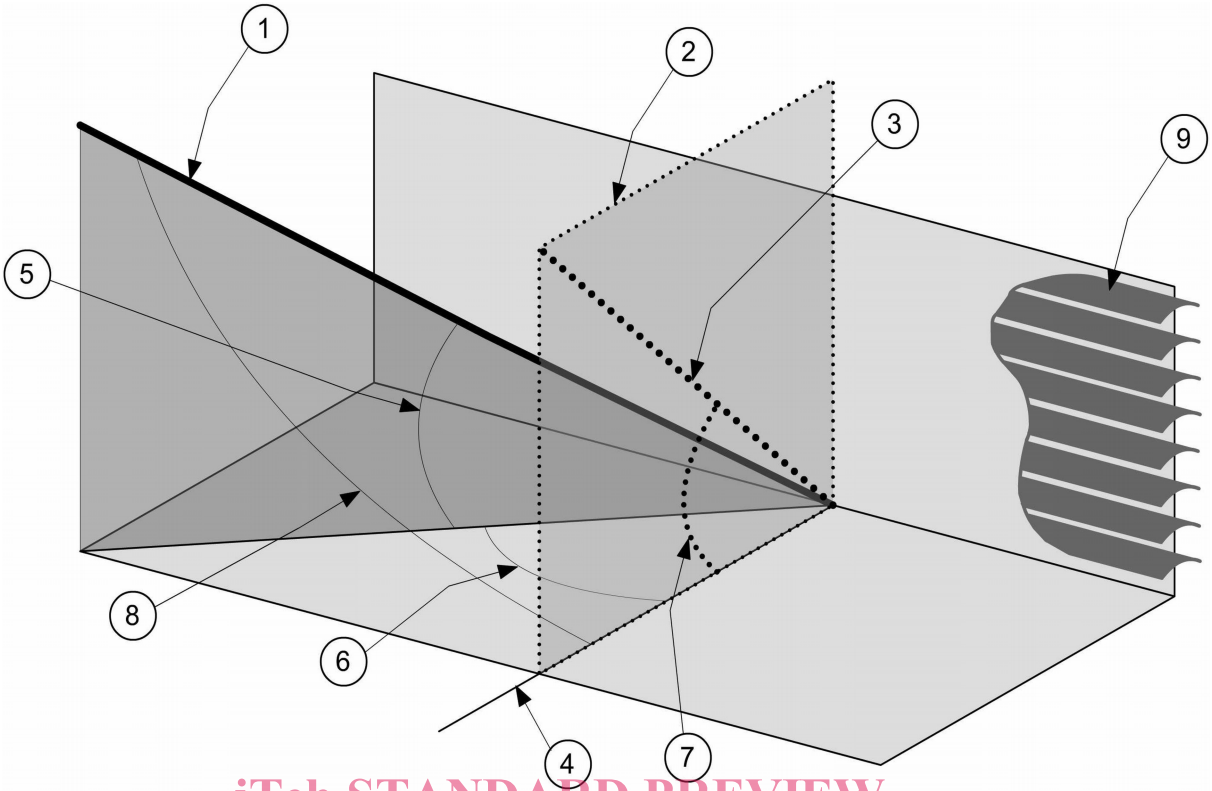
Note 1 to entry: The intersection of this projection plane and the plane of the solar protection device is horizontal.

Note 2 to entry: See Figure 1.

3.3.4
profile angle
α_p
projection of the altitude angle on a vertical plane which is perpendicular to the façade under consideration

Note 1 to entry: The profile angle is given by the following formula: $\tan \alpha_p = \tan \alpha_s / \cos \gamma$

Note 2 to entry: See Figure 1.



Key

1 direction of the incident radiation
2 vertical plane normal to the solar protection device
3 projected direction of the incident radiation
4 direction normal to the solar protection device
5 altitude angle α_s (angle in the vertical plane)
6 azimuth angle γ (angle in the horizontal plane)
7 profile angle α_p
8 angle of incidence θ
9 solar protection device

Figure 1 — Angle definitions

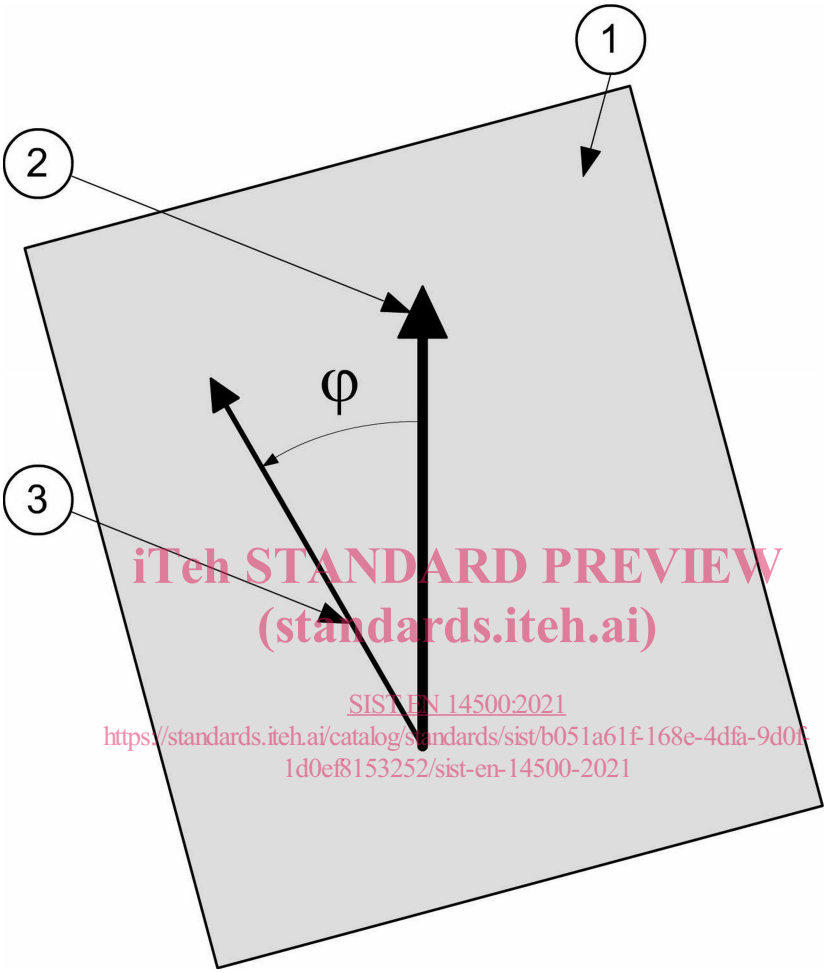
3.3.5
directional cut-off angle χ_{dir}
minimum angle of incidence, within a given plane normal to the solar protection device, at which the direct-direct transmittance $\tau_{dir\text{-}dir}$ is below a defined level

3.3.6
cut-off angle χ
maximum directional cut-off angle χ_{dir}, taking into account any plane normal to the solar protection device

Note 1 to entry: The maximum directional cut-off angle is described as “first angle” in EN 14501:2021.

3.3.7
rotation angle φ
within the plane of the sample, angle of rotation of the sample from the reference arrow defined conventionally by the supplier of the sample

Note 1 to entry: See Figure 2 and 7.4.2.



Key
1 test sample
2 reference arrow
3 upright position of the sample at the test equipment

Figure 2 — Rotation angle

4 Notations used

4.1 General

For the purpose of this document, the optical factors τ (transmittance), ρ (reflectance) and α (absorptance) are labelled with subscripts which indicate:

— the visual or solar properties;

— the geometry of the incident and the transmitted or reflected radiation.

4.2 Visual or solar properties

According to the respective spectrum, the following subscripts are used:

— “e” solar (energetic) characteristics, given for the total solar spectrum (wavelengths λ from 300 nm to 2 500 nm), according to EN 410;

— “v” visual characteristics, given for the standard illuminant D_{65} weighted with the sensitivity of the human eye (wavelengths λ from 380 nm to 780 nm), according to EN 410.

4.3 Geometry of the radiation

The following subscripts are used to indicate the geometry of the incident radiation (see Figure 3):

— « dir » for directional (parallel beam radiation with arbitrary direction θ);

— « n » for normal (parallel beam radiation with normal incidence θ = 0° or near normal in case of reflected radiation θ ≤ 8°);

— « dif » for diffuse (radiation evenly distributed from all incident directions θ).

The following subscripts are used to indicate the geometry of the transmitted or reflected radiation:

— « dir » for directional (radiation reflected or transmitted in the specular or regular direction respectively);

— « n » for normal (radiation transmitted in the normal direction or near normal in case of reflected radiation θ ≤ 8°);

— « h » for hemispherical (radiation collected in the half space behind the sample plane);

— « dif » for diffuse (radiation collected in all outgoing directions except the direct.

Complementary a particular subscript is used to distinguish values for the two different sides:

— « ’ » for properties of the reverse side of the main labelled side.

NOTE For example, when ρ relates to one side of a sample, ρ’ relates to the reverse side.