SLOVENSKI STANDARD
SIST EN 14500:2008

01-september-2008

Rolete in polokna - Toplotno in vizualno ugodje - Preskus in raḷ unske metode

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

Abschlüsse - Thermischer und visueller Komfort - Prüf- und Berechnungsverfahren

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

Ta slovenski standard je istoveten z: **EN 14500:2008**

ICS:

91.060.50	Vrata in okna	Doors and windows

SIST EN 14500:2008 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14500

May 2008

ICS 91.060.50

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 Berechnungsverfahren

This European Standard was approved by CEN on 11 April 2008.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword

This document (EN 14500:2008) 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 November 2008, and conflicting national standards shall be withdrawn at the latest by November 2008.

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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 the United Kingdom.

Introduction

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

This European Standard is mainly based on the European work performed in CEN/TC 89 "Thermal performance of buildings and building components" relating to solar and light transmittance of solar protection devices combined with glazing, and the document CIE 130.

1 Scope

This European Standard 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.

This European Standard also specifies the method to determine opacity characteristics of dim-out/black-out external blinds, internal blinds and shutters, as specified in EN 14501.

This European Standard applies to the whole range of shutters, awnings and blinds defined in EN 12216, described as solar protection devices in this European Standard. 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 Informative Annex D presents an approach for the determination of characteristics in case of projectable products.

Products using fluorescent or retroreflecting materials are outside the scope of this European Standard.

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.

CIE 130:1998, *Practical methods for the measurement of reflectance and transmittance*

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

EN 12216:2002, *Shutters, external blinds, internal blinds – Terminology, glossary and definitions*

EN 13363-1, *Solar protection devices combined with glazing – Calculation of solar and light transmittance – Part 1: Simplified method*

EN 13363-2:2005, *Solar protection devices combined with glazing – Calculation of total solar energy transmittance and light transmittance – Part 2: Detailed calculation method*

EN 14501:2005, *Blinds and Shutters – Thermal and visual comfort – Performance characteristics and classification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12216:2002, EN 14501:2005 and the following apply.

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

— Direct-hemispherical (or mixed) reflection: partly specular and partly diffuse reflection. Direct-hemispherical reflection is the sum of the diffuse and 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

— Direct-hemispherical (or mixed or total) transmission: partly directional and partly diffuse transmission. The direct-hemispherical transmission is the sum of the diffuse and 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

3.3.1 General

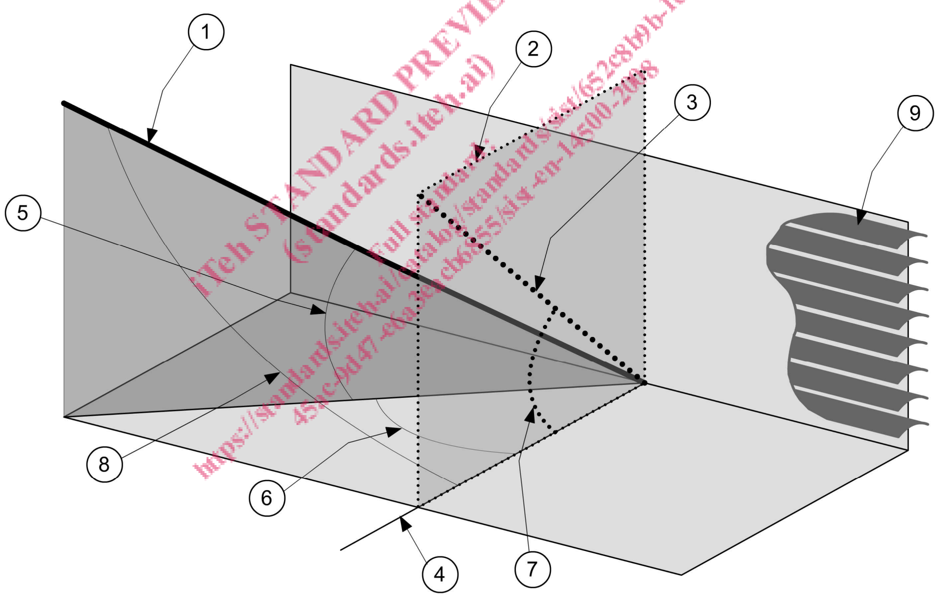
All the following angles are defined in a coordinate system which is fixed relative to the orientation of the solar protection device

3.3.2
angle of incidence
θ
angle between the normal to the plane of the solar protection device and the direction of the incident radiation (see Figure 1)

3.3.3
altitude angle
α_s
projection of the angle of incidence on the vertical plane which contains the direction of the incident radiation (see Figure 1)

3.3.4
azimuth angle
γ
projection of the angle of incidence on a plane which is normal to the plane of the solar protection device. The intersection of this projection plane and the plane of the solar protection device is horizontal (see Figure 1)

3.3.5
profile angle
α_p
projection of the altitude angle on a vertical plane which is perpendicular to the façade under consideration (see Figure 1). The profile angle is given by the following formula: tg α_p = tg θ / cos γ



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 (angle in the vertical plane)
6 Azimuth angle (angle in the horizontal plane)
7 Profile angle
8 Angle of incidence
9 Solar protection device

Figure 1 – Angle definitions

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

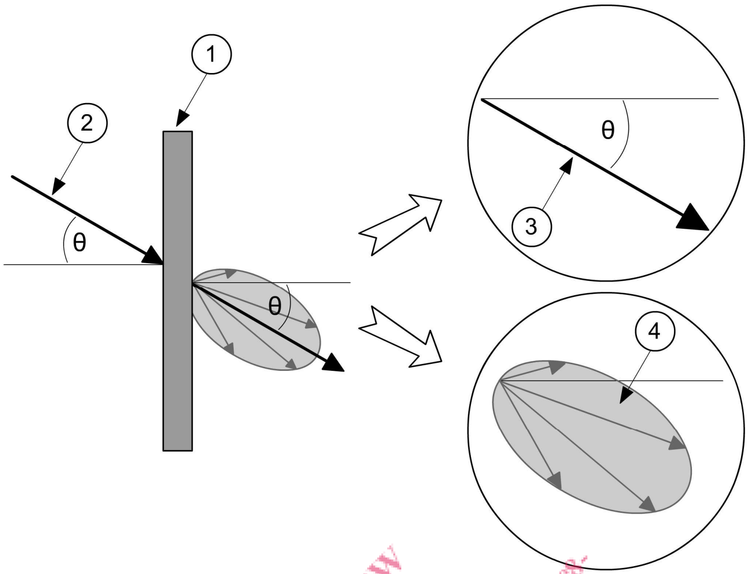
The following subscripts are used to indicate the geometry of the incident radiation and the geometry of the transmitted or reflected radiation (see Figure 2).

— « $_{dir}$ » for directional (fixed, but arbitrary direction θ);

— « $_n$ » for normal, or near normal in case of reflected radiation, the angle of incidence is $\theta = 0°$, or $\theta \leq 8°$ respectively;

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

— « $_{dif}$ » for diffuse.



Key

1 Solar protection device
2 Incident directional light or solar radiation
3 Transmitted direct component of light or solar radiation
4 Transmitted diffuse component of light or solar radiation

Figure 2 — Direct and diffuse components of transmitted radiation

4.4 Optical factors

The optical factors are designated as follows:

— $\tau_{e, n\text{-}n}$ normal-normal solar transmittance

— $\tau_{v, n\text{-}n}$ normal-normal light transmittance

— $\tau_{v, n\text{-}dif}$ normal-diffuse light transmittance

— $\tau_{v, n\text{-}h}$ normal-hemispherical light transmittance

— $\tau_{v, dir\text{-}h}$ direct-hemispherical light transmittance

— $\tau_{e, n\text{-}h}$ normal-hemispherical solar transmittance

— $\tau_{e, dir\text{-}h}$ direct-hemispherical solar transmittance

— $\rho_{v, n\text{-}h}$ normal-hemispherical light reflectance

— $\rho_{v, dir\text{-}h}$ direct-hemispherical light reflectance

— $\rho_{e, n\text{-}h}$ normal-hemispherical solar reflectance

— $\rho_{e, dir\text{-}h}$ direct-hemispherical solar reflectance

— $\tau_{v, dif\text{-}h}$ diffuse-hemispherical light transmittance