SLOVENSKI STANDARD
SIST EN 14501:2006

01-februar-2006

Rolete in polokna – Toplotno in vizualno ugodje – Delovne karakteristike in klasifikacija

Blinds and shutters - Thermal and visual comfort - Performance characteristics and classification

Abschlüsse - Thermischer und visueller Komfort - Leistungsanforderungen und Klassifizierung

Fermetures et stores - Confort thermique et lumineux - Caractérisation des performances et classification

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91.060.50	Vrata in okna	Doors and windows

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Blinds and shutters - Thermal and visual comfort - Performance characteristics and classification

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Abschlüsse - Thermischer und visueller Komfort - Leistungsanforderungen und Klassifizierung

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This European Standard (EN 14501:2005) 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of an identical text or by endorsement, at the latest by February 2006, and conflicting national standards shall be withdrawn at the latest by February 2006.

No existing European Standard is superseded.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

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

The methods of characterisation are related to performance requirements required as a complement to intrinsic performances (specific requirements) that internal blinds, external blinds or shutters shall fulfil as specified in EN 13120, EN 13561 and EN 13659.

The present European Standard is mainly based on the European work performed in TC 89 relating to solar and light transmittance of solar protection devices combined with glazing and the Technical Report CIE 130.

1 Scope

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.

It states the properties that shall be taken into account when comparing products.

It also specifies the corresponding parameters and classifications to quantify the following properties:

— for the thermal comfort:

  — the solar factor (total solar energy transmittance);

  — the secondary heat transfer factor;

  — the direct solar transmittance;

— for the visual comfort:

  — the opacity control;

  — the night privacy;

  — the visual contact with the outside;

  — the glare control;

  — the daylight utilisation;

  — the rendering of colours.

NOTE For other purposes, more detailed methods using different parameters can be used.

Some of the characteristics (e.g. g_{tot}) are not applicable when products are not parallel to the glazing (e.g. folding-arm awnings).

This European Standard is not applicable to the products using fluorescent materials.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. 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 12216:2002, *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*

prEN 14500[1], *Blinds and shutters — Thermal and visual comfort — Test methods*

3 Terms, definitions and symbols

For the purposes of this European Standard, the terms and definitions given in EN 12216:2002 and the following apply.

3.1
transmittance τ
ratio of the transmitted flux to the incident flux (see Figure 1)

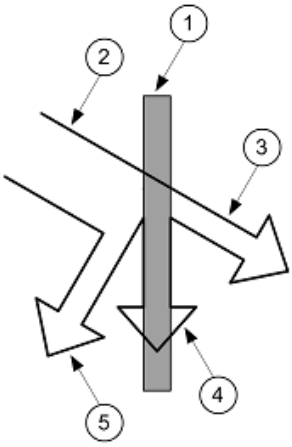
NOTE A more detailed definition is given in prEN 14500.

3.2
reflectance ρ
ratio of the reflected flux to the incident flux (see Figure 1)

NOTE A more detailed definition is given in prEN 14500.

3.3
absorptance α
ratio of the absorbed flux to the incident flux (see Figure 1)

[1] To be published.



Key
1 Solar protection device
2 Incident radiation E
3 Transmitted radiation $\tau \times E$
4 Absorbed radiation $\alpha \times E$
5 Reflected radiation $\rho \times E$

Figure 1 — Representation of the optical factors

3.4
openness coefficient
ratio between the area of the openings and the total area of the fabric

NOTE 1 For identical fabrics that differ only by the colour, the openness coefficient is considered as independent of the colour. The value of the openness coefficient should be measured for the darkest colour.

NOTE 2 The openness coefficient is determined according to prEN 14500.

3.5
solar factor g (total solar energy transmittance)
ratio between the total solar energy transmitted into a room through a window and the incident solar energy on the window

g is the solar factor of the glazing alone

g_{tot} is the solar factor of the combination of glazing and solar protection device

3.6
shading factor F_c
ratio of the solar factor of the combined glazing and solar protection device g_{tot} to that of the glazing alone g

$$F_c = \frac{g_{tot}}{g}$$

NOTE In some countries, F_c is known as z

3.7
secondary internal heat transfer factor $q_{i,\,tot}$
the part of the total absorbed radiation which is flowing inwards through the glazing and the shading device combined

3.8
colour rendering index R_a
index designed to express synthetically a quantitative evaluation of the differences in colour between eight test colours lit directly by the standard illuminant D_{65} and by the same illuminant transmitted through the solar protection device

3.9
operative temperature θ_{op}
uniform temperature of a room in which an occupant would exchange the same amount of heat by radiation plus convection as in the actual non-uniform environment

NOTE For more information on the calculation of $\theta_{op,}$ it is recommended to refer to EN ISO 13791 or EN ISO 13792.

4 Notations used

4.1 General

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

— 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 2500 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

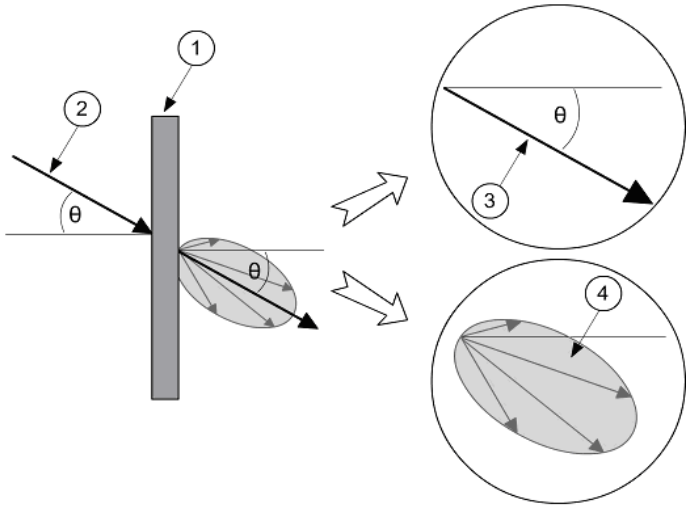
The following subscripts are used to indicate the geometry of the incident radiation and the geometry of the transmitted or reflected radiation (see Figure 2). For a more detailed definition see prEN 14500.

— « $_{dir}$ » 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;

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

5 Thermal comfort

5.1 General

Thermal comfort is mainly governed by the operative temperature θ_{op} within the room. θ_{op} depends on the air temperature, the air velocity and the temperature of the surrounding surfaces.

Solar gains shall be controlled in order to limit the operative temperature. The classification of the total solar energy transmittance g_{tot} is given in 5.2.4.

Solar protection devices influence the thermal comfort in three aspects:

— The mean operative temperature and/or the cooling loads are influenced by the solar gains which depend on the size of the windows and the total solar energy transmittance g_{tot}.

— The solar protection device may cause higher local values of θ_{op} when irradiated by the sun due to higher temperatures on the inner surface of the glazing or solar protection device. This effect is quantified by the secondary internal heat transfer factor $q_{i,\,tot}$.

— The solar protection device may prevent persons and surroundings in the room from being irradiated directly. This effect is quantified by the direct-direct solar transmittance $\tau_{e,\,dir\text{-}dir}$.

The performance classes for the thermal comfort used in the following clauses are specified in Table 1.

Table 1 — Definition of classes

Class	Influence on thermal comfort				
	0	1	2	3	4
	very little effect	little effect	moderate effect	good effect	very good effect

5.2 Control of solar gains – Total solar energy transmittance g_{tot}

5.2.1 General

The limitation of solar gains is one of the most important aspects of summer thermal comfort when there is no mechanical cooling system. The solar gains are directly proportional to the total solar energy transmittance g_{tot}.

g_{tot} depends on the glazing and the solar protection device g_{tot} may be determined for the four different reference glazings given in Annex A using either the methodology given in 5.2.2 or in 5.2.3. For general product labelling (independent from the installation conditions), the calculation according to 5.2.2 and the reference glazing C, specified in Annex A, shall be used.

The solar factor g of glazing alone, needed for the calculation of $g_{tot,}$ shall be calculated according to EN 410.

NOTE 1 The influence of solar protection devices on the solar gains can also be represented by the shading factor F_C. The shading factor depends not only on the solar protection device but also on the glazing. If F_C is used for product characterisation, it should be given for the 4 different reference glazings, defined in Annex A.

For windows with slatted or louvered devices, the values of the total solar factor g_{tot} shall be specified for at least two positions:

— the fully closed position of the slats at normal incidence;

— the slats tilted at 45° and irradiation with 30° altitude angle, 0° azimuth angle.

In the case of roller shutters with light and ventilation slots, g_{tot} shall be calculated:

— in the fully extended and closed position at normal incidence;

— in the fully extended and open position at normal incidence.

NOTE 2 For slatted or louvered devices tilted at 45° the values τ^{corr}_{e} specified in EN 13363-1 can be used as the direct-hemispherical solar transmittance except for mirror-finish products and under the boundary condition that there is no direct solar transmission for the tilt angle of the slats under consideration.

NOTE 3 In the near future there will be a standard for the direct calorimetric measurement of g_{tot}.

NOTE 4 For a more detailed method for the calculation of the transmittance and the reflectance of slatted devices, see the calculation method given in EN 13363-2. The view factors given in Annex A of EN 13363-2:2005 are only applicable for venetian blinds with a ratio of d/l =1 for slat width l and slat distance d. For the cases described above see prEN 14500.