



SLOVENSKI STANDARD
SIST EN 12254:1999
01-julij-1999

Zaslони pri delu z laserji – Varovalne zahteve in preskušanje)

Screens for laser working places - Safety requirements and testing

Abschirmungen an Laserarbeitsplätzen - Sicherheitstechnische Anforderungen und Prüfung

Ecrans pour postes de travail au laser - Exigences et essais de sécurité

Ta slovenski standard je istoveten z: EN 12254:1998

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English version

Screens for laser working places - Safety requirements and testing

Ecrans pour postes de travail au laser - Exigences et essais de sécurité

Abschirmungen an Laserarbeitsplätzen - Sicherheitstechnische Anforderungen und Prüfung

This European Standard was approved by CEN on 16 October 1998.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 85 "Eye protective equipment", 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of an identical text or by endorsement, at the latest by June 1999, and conflicting national standards shall be withdrawn at the latest by June 1999.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard specifies functional requirements and a product labelling system applicable to a range of temporary and permanent passive guards (in the following called screens) for protection against laser radiation. This standard includes test methods for testing functional performance and also the specification of the user documentation to be supplied with the product. The screens are designed to protect the user from uncontrolled emission of direct and/or diffuse radiation for a defined exposure to lasers, based on the necessary functional requirements for any particular application being determined by risk assessment principles.

This standard applies to supervised screens for installations in working places at which laser radiation up to a maximum mean power of 100 W or single pulse energy of 30 J occurs within the spectral range between 180 nm (0,18 μm) and 10^6 nm (1000 μm).

This standard applies to the protection against laser radiation only. This standard does not apply to other hazards including hazards from secondary radiation that can arise during, for example, material processing.

This standard gives guidance on how to select such screens.

The following are not considered to be within the scope of the standard:

- laser enclosures and housings that are supplied as part of the laser product or are supplied to be fitted to a laser system to form a laser product (according to IEC 60 825-1:1998);
- any screen whose protective properties are limited to a restricted range of angles of incidence (e.g. some interference filters).

2 Normative References

This European Standard incorporates by dated or undated reference provisions by other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent revisions to or amendments 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.

EN 165:1995	Personal eye-protection - Vocabulary
EN 166:1995	Personal eye-protection - Specifications
EN 168:1995	Personal eye-protection - Non-optical test methods
EN 169:1992	Personal eye-protection - Filters for welding and related techniques - Transmittance requirements and recommended utilisation
EN 1598:1997	Health and safety in welding and allied processes - Transparent welding curtains, strips and screens for arc welding processes
IEC 60825-1:1998	Safety of laser products - Part 1: Equipment classification, requirements and user's guide
IEC 60050-845:1987	International electrotechnical vocabulary - Chapter 845: Lighting

- IEC 60 825-4:1997 Safety of laser products - Part 4: Laser guards
ISO 1184:1983 Plastics - Determination of tensile properties of films

3 Definitions

For the purposes of this standard the definitions and terminology of IEC 60 825-1:1998, EN 165:1995, IEC 60825-4:1997 and IEC 60050-845:1987 apply.

4 Requirements

4.1 Spectral transmittance

The relationship between spectral transmittance at the laser wavelength and stability to laser radiation is based on the maximum permissible exposure (MPE) shown in IEC 60 825-1:1998. To simplify product specification, tests are conducted for laser test conditions described in table 1. The laser test conditions are referred to by the symbols D, I, R and M.

Table 1 : Duration of test applicable to screens for laser working places

Test condition (Corresponding laser designation)	Pulse durations	Number of pulses
D (Continuous wave (CW) laser)	100	1
I (Pulsed laser)	10^{-6} to 10^{-2}	1000
R (Giant-pulsed laser)	10^{-9} to 10^{-6}	1000
M (Mode-coupled pulsed laser)	$\leq 10^{-9}$	100 000

NOTE : The listed pulse durations are values of typical lasers. A laser with a pulse length in this range of values is recommended for testing. Total exposure time for each test should be about 100 s.

4.2 Stability to laser radiation

The screens shall not lose their protective properties and shall stay within the scale number under effect of laser radiation with the power and energy density as specified in table 2 including induced transmission (reversible bleaching).

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4.3 Stability to UV radiation

The requirements of 4.1 to 4.2 shall be met after exposure for 50 h as specified in clause 6 of EN 168:1995. The spectral transmittance at the laser wavelengths shall not exceed the maximum permissible spectral transmittance of the corresponding scale number.

4.4 Stability at elevated temperature

The requirements of 4.1 to 4.2 shall be met after the screens have been stored for 5 h in a climatic cabinet at a temperature of $(55 \pm 2)^{\circ}\text{C}$ and a relative humidity of at least 95 %, and then stored for at least 2 h at room temperature $(23 \pm 5)^{\circ}\text{C}$.

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Table 2 : Scale numbers of screens for laser working places (maximum spectral transmittance and resistance to laser radiation)

Scale Number	Maximum spectral transmittance at the laser wavelength to $\tau(\lambda)$	Mean power and single pulse energy density for testing protective properties and resistance to laser radiation in the wavelength range													
		180 nm to 315 nm			>315 nm to 1050 nm			>1050 nm to 1400 nm			>1400 nm to 1000 μm				
		D	I, R	M	D	D	D	D	D	D	D	D	D	D	
A 1	10^{-1}	$>0,25$ s	$>10^{-9}$ to 0,25 s	$\leq 10^{-9}$ s	$>5 \cdot 10^{-3}$ s	$>2 \cdot 10^{-3}$ s	$2,5 \cdot 10^2$	10	$2,5 \cdot 10^2$	0,05	$>10^{-9}$ to 0,01 s	$\leq 10^{-9}$ s	$>0,1$ s	$>10^{-9}$ to 0,1 s	$\leq 10^{-9}$ s
A 2	10^{-2}	E_D W/m ²	$H_{I,R}$ J/m ²	E_M W/m ²	E_D W/m ²	E_D W/m ²	10^1	10^2	$2,5 \cdot 10^2$	0,5	$H_{I,R}$ J/m ²	E_M W/m ²	E_D W/m ²	$H_{I,R}$ J/m ²	E_M W/m ²
A 3	10^{-3}	1	$3 \cdot 10^4$	$3 \cdot 10^{13}$	10^3	$2,5 \cdot 10^4$	10^3	10^3	$2,5 \cdot 10^4$	5	5	$5 \cdot 10^9$	10^6	10^5	10^{14}
A 4	10^{-4}	10	$3 \cdot 10^5$	$3 \cdot 10^{14}$	10^4	$2,5 \cdot 10^5$	10^4	10^4	$2,5 \cdot 10^5$	50	50	$5 \cdot 10^{10}$	10^7	10^6	10^{15}
A 5	10^{-5}	10^2	$3 \cdot 10^6$	$3 \cdot 10^{15}$	10^5	$2,5 \cdot 10^6$	10^5	10^5	$2,5 \cdot 10^6$	$5 \cdot 10^2$	$5 \cdot 10^2$	$5 \cdot 10^{11}$	10^8	10^7	10^{16}
A 6	10^{-6}	10^3	$3 \cdot 10^7$	$3 \cdot 10^{16}$	10^6	$2,5 \cdot 10^7$	10^6	10^6	$2,5 \cdot 10^7$	$5 \cdot 10^3$	$5 \cdot 10^3$	$5 \cdot 10^{12}$	10^9	10^8	10^{17}
A 7	10^{-7}	104	$3 \cdot 10^8$	$3 \cdot 10^{17}$	10^7	$2,5 \cdot 10^8$	10^7	10^7	$2,5 \cdot 10^8$	$5 \cdot 10^4$	$5 \cdot 10^4$	$5 \cdot 10^{13}$	10^{10}	10^9	10^{18}
A 8	10^{-8}	105	$3 \cdot 10^9$	$3 \cdot 10^{18}$	10^8	$2,5 \cdot 10^9$	10^8	10^8	$2,5 \cdot 10^9$	$5 \cdot 10^5$	$5 \cdot 10^5$	$5 \cdot 10^{14}$	10^{11}	10^{10}	10^{19}
A 9	10^{-9}	106	$3 \cdot 10^{10}$	$3 \cdot 10^{19}$	10^9	$2,5 \cdot 10^{10}$	10^9	10^9	$2,5 \cdot 10^{10}$	$5 \cdot 10^6$	$5 \cdot 10^6$	$5 \cdot 10^{15}$	10^{12}	10^{11}	10^{20}
A 10	10^{-10}	107	$3 \cdot 10^{11}$	$3 \cdot 10^{20}$	10^{10}	$2,5 \cdot 10^{11}$	10^{10}	10^{10}	$2,5 \cdot 10^{11}$	$5 \cdot 10^7$	$5 \cdot 10^7$	$5 \cdot 10^{16}$	10^{13}	10^{12}	10^{21}

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