



SLOVENSKI STANDARD

SIST EN 207:1999/A1:2003

01-januar-2003

Personal eye-protection - Filters and eye-protectors against laser radiation (laser eye-protectors)

Personal eye-protection - Filters and eye-protectors against laser radiation (laser eye-protectors)

Persönlicher Augenschutz - Filter und Augenschutzgeräte gegen Laserstrahlung (Laserschutzbrillen)

Protection individuelle de l'oeil - Filtres et protecteurs de l'oeil contre les rayonnements laser (lunettes de protection laser)

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Ta slovenski standard je istoveten z: **EN 207:1998/A1:2002**

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ICS:

13.340.20 Varovalna oprema za glavo Head protective equipment

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en

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ICS 13.340.20

English version

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This amendment A1 modifies the European Standard EN 207:1998; it was approved by CEN on 30 May 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This amendment 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 Management Centre 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, Malta, 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 Amendment EN 207:1998/A1:2002 to the EN 207:1998 has been prepared by Technical Committee CEN/TC 85 "Eye protective equipment", the secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 207:1998 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2003, and conflicting national standards shall be withdrawn at the latest by February 2003.

This Amendment to the European Standard EN 207:1998 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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.

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Table 1 — Scale numbers (maximum spectral transmittance and stability to laser radiation) of the filters and/or eye-protectors against laser radiations

Scale number	Maximum spectral transmittance at the laser wavelength $\tau(\lambda)$	Power (E) and energy (H) density for testing the protective effect and stability to laser radiation in the wavelength range								
		180 nm to 315 nm			> 315 nm to 1400 nm			> 1400 to 1000 μm		
		For test condition/pulse duration in s								
		D $\geq 3 \cdot 10^4$	I, R 10^{-9} to $3 \cdot 10^4$	M $< 10^{-9}$	D $> 5 \cdot 10^{-4}$	I, R 10^{-9} to $5 \cdot 10^{-4}$	M $< 10^{-9}$	D $> 0,1$	I, R 10^{-9} to 0,1	M $< 10^{-9}$
E_D W/m ²	$H_{I,R}$ J/m ²	E_M W/m ²	E_D W/m ²	$H_{I,R}$ J/m ²	H_M J/m ²	E_D W/m ²	$H_{I,R}$ J/m ²	E_M W/m ²		
L1	10^{-1}	0,01	$3 \cdot 10^2$	$3 \cdot 10^{11}$	10^2	0,05	$1,5 \cdot 10^{-3}$	10^4	10^3	10^{12}
L2	10^{-2}	0,1	$3 \cdot 10^3$	$3 \cdot 10^{12}$	10^3	0,5	$1,5 \cdot 10^{-2}$	10^5	10^4	10^{13}
L3	10^{-3}	1	$3 \cdot 10^4$	$3 \cdot 10^{13}$	10^4	5	0,15	10^6	10^5	10^{14}
L4	10^{-4}	10	$3 \cdot 10^5$	$3 \cdot 10^{14}$	10^5	50	1,5	10^7	10^6	10^{15}
L5	10^{-5}	10^2	$3 \cdot 10^6$	$3 \cdot 10^{15}$	10^6	$5 \cdot 10^2$	15	10^8	10^7	10^{16}
L6	10^{-6}	10^3	$3 \cdot 10^7$	$3 \cdot 10^{16}$	10^7	$5 \cdot 10^3$	$1,5 \cdot 10^2$	10^9	10^8	10^{17}
L7	10^{-7}	10^4	$3 \cdot 10^8$	$3 \cdot 10^{17}$	10^8	$5 \cdot 10^4$	$1,5 \cdot 10^3$	10^{10}	10^9	10^{18}
L8	10^{-8}	10^5	$3 \cdot 10^9$	$3 \cdot 10^{18}$	10^9	$5 \cdot 10^5$	$1,5 \cdot 10^4$	10^{11}	10^{10}	10^{19}
L9	10^{-9}	10^6	$3 \cdot 10^{10}$	$3 \cdot 10^{19}$	10^{10}	$5 \cdot 10^6$	$1,5 \cdot 10^5$	10^{12}	10^{11}	10^{20}
L10	10^{-10}	10^7	$3 \cdot 10^{11}$	$3 \cdot 10^{20}$	10^{11}	$5 \cdot 10^7$	$1,5 \cdot 10^6$	10^{13}	10^{12}	10^{21}

The symbols D, I, R and M relative to the test conditions are explained in Table 4.

3.10 Frames

3.10.1 Filters shall not be interchangeable in the frame.

3.10.2 The frame shall be designed so that no laser radiation can penetrate from the side unintentionally. This requirement is met if for the horizontal angle range α from -50° (nasal side) to $+90^\circ$ (temporal side) the vertical angle β range is protected within the following limit angles in degree ($^\circ$).

The upward limit β_u of the protected range shall be:

$$\beta_u = 55 - 0,0013 \cdot (\alpha - 12)^2 - 1,3 \cdot 10^{-6} \cdot (\alpha - 12)^4$$

The downward limit β_l of the protected range shall be:

$$\beta_l = -70 + 10^{-5} \cdot (\alpha - 22)^2 + 2,3 \cdot 10^{-6} \cdot (\alpha - 22)^4$$

Replace the third paragraph of section 4.3 by the following:

4.3 Stability to laser radiation

The diameter d_{63} of the laser beam during this test shall be $\geq 0,5$ mm for pulse durations < 1 ns.

The diameter d_{63} of the laser beam during this test shall be ≥ 2 mm in all other cases. A beam diameter d_{63} between 0,5 mm and 2,0 mm may be used if the irradiance $E(d)$ or radiant exposure $H(d)$ used at a diameter d is increased compared to the nominal value E_n or H_n , respectively by the factor given by the following formula:

$$E(d) / E_n = a_0 + a_1 \cdot e^{-d/a_2} \text{ or } H(d) / H_n = a_0 + a_1 \cdot e^{-d/a_2}$$

where the constants are in the case of filters consisting of

— glass or containing glass

$$a_0 = 0,769, \quad a_1 = 18,29, \quad a_2 = 0,4778.$$

— plastics

$$a_0 = 1, \quad a_1 = 5,66, \quad a_2 = 0,4498$$

In the case of rectangular beams, the dimensions specified apply to the shortest side of the rectangle.

NOTE: The number of decimals of the coefficients was chosen to give a smooth transition at a 2 mm beam diameter. It should not be interpreted as a requirement for measurement accuracy.

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4.10 Frames

4.10.1 It shall be tested by means of visual inspection whether the filters are interchangeable.

4.10.2 The test shall be carried out using the method given in 4.8. The zero values of the angles α and β are reached when the axis A, B and C of the test apparatus are perpendicular to each other.

6 Marking

6.1 Eye-protectors

Replace the text by the following:

The following elements shall be marked permanently on the filters or the frames for identification:

- a) wavelength(s) or wavelength range (given in nm) in which the filter provides protection;
- b) the symbol for the test condition;
- c) scale number;

If the filter guarantees protection in one or several spectral ranges, the lowest scale number shall be given in the corresponding spectral range.

- d) manufacturer's identification mark;

In order to prevent multiple use, only marks granted at European or national level shall be used.

- e) if the eye-protector satisfies the mechanical strength requirement in 3.11, one of the marks specified in clause 9 of EN 166:2001 shall also be added.

If the symbols are marked on the filters, they shall not impair vision nor the protective effect.

EN 207:1998/A1:2002 (E)

Example 1:

	633	D	L5	X
Wavelength for which the eye-protector gives protection				
Test condition in accordance with Table 4				
Scale number in accordance with Table 1				
Manufacturer's identification mark				

Example 2:

	1064	DI	L7	X
Wavelength for which the eye-protector gives protection				
Test conditions in accordance with Table 4				
Scale number in accordance with Table 1				
Manufacturer's identification mark				

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Example 3:

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 630-700 DR L8 X S

	630-700	DR	L8	X	S
Wavelength range for which the eye-protector gives protection					
Test conditions in accordance with Table 4					
Scale number in accordance with Table 1					
Manufacturer's identification mark					
Mechanical strength symbol					

If several marks apply to a laser radiation eye-protector, all these marks shall be applied, or alternatively the manufacturer's identification mark, the certification mark and the mechanical strength symbol shall be specified only once; the other identification elements shall be separated by a +.

Example 4:

Marking can become very lengthy if a filter or a frame protects against several wavelength. In these cases, the mark may be pooled as follows:

10600 D L3 + IR L4

1064 DI L8 + R L 9

633 D L4 + IR L5

X S

where the symbols have the same meaning as in precedent examples.

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