

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

The European Standard EN 207:1998, with the incorporation of amendment A1:2002, has the status of a British Standard

ICS 13.340.20

National foreword

This British Standard is the official English language version of EN 207:1998, including amendment A1:2002 and Corrigendum September 2004. It supersedes BS EN 207:1994 which is withdrawn.

NOTE The poor quality of Figure A.1 was noticed when the English language version of amendment A1:2002 to EN 207:1998 was incorporated into the national standard. The error has been reported to CEN in a proposal to amend the figure supplied in amendment A1:2002 to the European Standard.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted by Technical Committee PH/2, Eye protection, to Subcommittee PH/2/3, Eye protection against lasers, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 17 and a back cover.

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Amendments issued since publication

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15399 Corrigendum No. 1	27 October 2004	Replacement of Table B.2

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English version

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

(includes amendment A1:2002)

Protection individuelle de l'oeil —
Filtres et protecteurs de l'oeil contre les
rayonnements laser (lunettes de protection
laser)
(inclut l'amendement A1:2002)

Persönlicher Augenschutz —
Filter und Augenschutzgeräte gegen
Laserstrahlung (Laserschutzbrillen)
(enthält Änderung A1:2002)

This European Standard was approved by CEN on 24 August 1998. Amendment A1 was approved by CEN on 30 May 2002.

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CEN

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 supersedes EN 207:1993.

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 March 1999, and conflicting national standards shall be withdrawn at the latest by March 1999.

This European Standard 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).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

Annex A, Annex B and Annex ZA are informative.

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.

Foreword to amendment A1

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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1 Scope

This European Standard applies to eye-protectors used for protection against laser radiation as defined in EN 60825-1:1994 [i.e. LED (light emitting diode) radiation is included] in the spectral range 180 nm (0,18 μm) to 1 000 μm . It defines requirements, test methods and marking. A guide is given in Annex B with regard to selection and use.

EN 208 applies for laser adjustment eye-protectors.

NOTE Before selecting eye-protection according to this standard a risk assessment should be undertaken (see Annex B).

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions 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 166:1995, Personal eye-protection — Specifications.

EN 167:1995, Personal eye-protection — Optical test methods.

EN 168:1995, Personal eye-protection — Non-optical test methods.

EN 208, Personal eye-protection — Eye-protectors for adjustment work on lasers and laser systems (laser adjustment eye-protectors).

EN 60825-1:1994, Safety of laser products — Part 1: Equipment classification, requirements and user's guide.

ISO/CIE 10526:1991, CIE standard colorimetric illuminants.

ISO/CIE 10527:1991, CIE standard colorimetric observers.

3 Requirements

3.1 Spectral transmittance of filters and frames

When tested according to 4.1, the maximum spectral transmittance for the individual scale numbers which shall not be exceeded at the laser wavelength(s) against which they afford protection shall be as given in Table 1.

3.2 Luminous transmittance of filters

When assessed in accordance with 4.2, the luminous transmittance of the filter relative to the D65 standard illuminant (see ISO/CIE 10526:1991) shall be at least 20 %, unless it is recommended in the information supplied by the manufacturer to increase accordingly by the intensity of illumination at the relevant workplace.

3.3 Stability of filters and frames to laser radiation

When tested according to 4.3, the filters and frames shall meet the requirements of 3.1 and shall not lose their protective effect under the influence of laser radiation of the power (E) or energy density (H) given in Table 1 for a period of at least 10 s and for 100 pulses and shall not show any induced transmission (reversible bleaching). No splinters shall come away from the side of the filter facing the eye under the influence of the laser radiation. Any melting or other damage of the surface is not considered negative if the protective effect is still ensured.



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 1 400 nm			>1 400 nm to 1 000 μm		
		D	I, R	M	D	I, R	M	D	I, R	M
		$\geq 3 \times 10^4$	10^{-9} to 3×10^4	$< 10^{-9}$	$> 5 \times 10^{-4}$	10^{-9} to 5×10^{-4}	$< 10^{-9}$	$> 0,1$	10^{-9} to $0,1$	$< 10^{-9}$
		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	3×10^2	3×10^{11}	10^2	0,05	$1,5 \times 10^7$	10^4	10^3	10^{12}
L2	10^{-2}	0,1	3×10^3	3×10^{12}	10^3	0,5	$1,5 \times 10^8$	10^5	10^4	10^{13}
L3	10^{-3}	1	3×10^4	3×10^{13}	10^4	5	0,15	10^6	10^5	10^{14}
L4	10^{-4}	10	3×10^5	3×10^{14}	10^5	5	1,5	10^7	10^6	10^{15}
L5	10^{-5}	10^2	3×10^6	3×10^{15}	10^6	5×10^2	15	10^8	10^7	10^{16}
L6	10^{-6}	10^3	3×10^7	3×10^{16}	10^7	5×10^3	$1,5 \times 10^2$	10^9	10^8	10^{17}
L7	10^{-7}	10^4	3×10^8	3×10^{17}	10^8	5×10^4	$1,5 \times 10^3$	10^{10}	10^9	10^{18}
L8	10^{-8}	10^5	3×10^9	3×10^{18}	10^9	5×10^5	$1,5 \times 10^4$	10^{11}	10^{10}	10^{19}
L9	10^{-9}	10^6	3×10^{10}	3×10^{19}	10^{10}	5×10^6	$1,5 \times 10^5$	10^{12}	10^{11}	10^{20}
L10	10^{-10}	10^7	3×10^{11}	3×10^{20}	10^{11}	5×10^7	$1,5 \times 10^6$	10^{13}	10^{12}	10^{21}

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



3.4 Refractive values of filters and eye-protectors

When assessed in accordance with 4.4, the maximum refractive values of filters and eye-protectors with no corrective effect shall be as given in Table 2. They apply to the range specified in 7.1.2 of EN 166:1995.

NOTE The requirements of the national standards apply to laser radiation protection filters with a corrective effect up until such times as corresponding European Standards have been prepared.

Table 2 — Maximum refractive values of filters and eye-protectors with no corrective effect

Spherical power	Astigmatic power	Prismatic power difference		
		Horizontal		Vertical
		Base out cm/m	Base in cm/m	cm/m
$\pm 0,09$	$\pm 0,09$	0,75	0,25	0,25

3.5 Quality of material and surface of filters

3.5.1 Material and surface defects

The material and surface defects of filters shall be assessed in accordance with 4.5.1.

Except for a marginal area 5 mm wide, filters shall be free from any material or surface defects likely to impair the intended use, such as bubbles, scratches, inclusions, dull spots, mould marks, scoring or other defects originating from the manufacturing process. No holes are allowed anywhere in the filters.

3.5.2 Scattered light

The reduced luminous coefficient l^* of a filter, determined in accordance with 4.5.2, shall not be greater than:

$$l^* = 0,50 \text{ (cd/m}^2\text{)/lx}$$