

Personal eye protection — Sunglasses, sunglare filters for general use and filters for direct observation of the sun

The European Standard EN 1836:1997, including amendments A1:2001 and A2:2003, has the status of British Standard

ICS 13.340.20

Committees responsible for this British Standard

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- Association of Consulting Scientists
- British Retail Consortium
- British Safety Industry Federation
- College of Optometrists
- Consumer Policy Committee of BSI
- Department of Health
- Electricity Association
- Federation of Manufacturing Opticians
- Flat Glass Manufacturers' Association
- Health and Safety Executive
- Institution of Mechanical Engineers
- Manufacturing Science Finance
- Ministry of Defence
- National Physical Laboratory
- Royal College of Ophthalmologists
- Safety Equipment Association

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National foreword

This British Standard has been prepared by Subcommittee PH/2/1 and is the English language version of EN 1836:1997, including amendments A1:2001 and A2:2003, *Personal eye protection — Sunglasses and sunglare filters for general use*, published by the European Committee for Standardization (CEN). It supersedes BS 2724:1987, which is withdrawn.

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**.

Cross-references

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This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 30, an inside back cover and a back cover.

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English version

Personal eye protection — Sunglasses, sunglare filters for general use and filters for direct observation of the sun

(includes amendments A1:2001 and A2:2003)

Protection individuelle de l'oeil —
Lunettes solaires, filtres de protection contre les
rayonnements solaires pour usage général et
filtres pour l'observation directe du soleil
(inclut les amendements A1:2001 et A2:2003)

Persönlicher Augenschutz — Sonnenbrillen
Sonnenschutzfilter für den allgemeinen
Gebrauch und Filt für die direkte
Betrachtung der Sonne
(enthält Änderungen A1:2001 und A2:2003)

This European Standard was approved by CEN on 1996-12-19. Amendment A1 was approved by CEN on 2001-07-27; amendment A2 was approved by CEN on 2003-09-01. 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.

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CEN

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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 July 1997, and conflicting national standards shall be withdrawn at the latest by July 1997.

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 is informative. Annex B, Annex C and Annex D are normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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 1836:1997/A1:2001 to the EN 1836:1997 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 February 2002, and conflicting national standards shall be withdrawn at the latest by February 2002.

This amendment to the European Standard EN 1836:1997 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).

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Foreword to amendment A2

This document (EN 1836:1997/A2:2003) has been prepared by Technical Committee CEN/TC 85, Eye-protective equipment, the Secretariat of which is held by AFNOR.

This document 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).

This amendment to the European Standard EN 1836:1997 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2004 and conflicting national standards shall be withdrawn at the latest by May 2004.

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

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard specifies physical properties (mechanical, optical etc.) for sunglasses and sunglare filters of nominal plano power which are not prescription lenses, intended for protection against solar radiation for general use, for social and domestic purposes, including road use and driving. ^{A2} This standard specifies also requirements for filters for the direct observation of the sun (e.g. during eclipses). ^{A2} Guidance for selection and use of these filters is given in (informative) Annex A. For sunglasses and sunglare filters for industrial use, EN 166:1995 and EN 172:1994 apply.

This standard does not apply to eyewear for protection against radiation from artificial light sources, such as those used in solaria. EN 170:1992 applies for these filters.

This standard does not apply to ski goggles, for which EN 174:1996 applies, or other types of eye protection used for leisure activities.

This standard does not apply to sunglasses and filters that have been medically prescribed for attenuating solar radiation.

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 165:1995, *Personal eye protection — Vocabulary*.

^{A2} EN 166:2001 ^{A2}, *Personal eye protection — Specifications*.

^{A2} EN 167:2001 ^{A2}, *Personal eye protection — Optical test methods*.

^{A2} EN 168:2001 ^{A2}, *Personal eye protection — Non-optical test methods*.

EN 170:1992, *Personal eye protection — Ultraviolet filters — Transmittance requirements and recommended use*.

EN 172:1994, *Personal eye protection — Sunglare filters for industrial use*.

^{A2} EN 174:2001 ^{A2}, *Personal eye protection — Ski goggles for downhill skiing*.

^{A2} EN 1811, *Reference test method for release of nickel from products intended to come into direct and prolonged contact with the skin*.

ENV 14027, *Method for the simulation of wear before the detection of nickel release from coated metal and combination spectacle frames*. ^{A2}

IEC 50(845):1987, *International Electrotechnical vocabulary — Chapter 845: Lighting*.

CIE 85:1989, *Solar spectral irradiance*.

^{A2} ISO 8624:2002 ^{A2}, *Optics and optical instruments — Ophthalmic optics — Measuring system for spectacle frames*.

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

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

3 Definitions

For the purposes of this standard, the definitions of EN 165:1995 and of IEC 50 (845):1987 apply together with the following:

3.1

absorptance (absorption)

absorptance is the difference 1 minus transmittance minus reflectance

NOTE Some manufacturers use the term absorption and specify the value of the absorption as the difference 1 minus the luminous transmittance.

3.2**degree of polarisation, P**

is defined as:

$$P = \frac{\tau_{pmax} - \tau_{pmin}}{\tau_{pmax} + \tau_{pmin}}$$

where

- τ_{pmax} the maximum values of luminous transmittance as determined with linearly polarised radiation;
- τ_{pmin} the minimum values of luminous transmittance as determined with linearly polarised radiation.

3.3**luminous transmittance of photochromic sunglare filters**

five different values of the luminous transmittance of photochromic sunglare filters are defined by this standard:

- τ_0 luminous transmittance in the faded state as reached at 23 °C after specified conditioning;
- τ_1 luminous transmittance in the darkened state as reached at 23 °C after specified irradiation simulating mean outdoor conditions;
- τ_w luminous transmittance in the darkened state as reached at 5 °C after specified irradiation simulating outdoor conditions at low temperatures;
- τ_s luminous transmittance in the darkened state as reached at 35 °C after specified irradiation simulating outdoor conditions at high temperatures;
- τ_a luminous transmittance in the darkened state as reached at 23 °C after specified irradiation simulating reduced light conditions.

3.4**photochromic range, R_p**

range given by the ratio of the difference of the luminous transmittance in the faded state τ_0 and the luminous transmittance in the darkened state τ_1 to the luminous transmittance in the faded state τ_0 :

$$R_p = \frac{\tau_0 - \tau_1}{\tau_0}$$

3.5**photochromic sunglare filter**

filter that reversibly alters its luminous transmittance under the influence of sunlight

NOTE This alteration is not instantaneous, but is a function of a temperature and material dependent time constant. In this way, the luminous transmittance of the filter adjusts itself within certain limits to the ambient radiant flux.

3.6**polarizing sunglare filter**

filter of which transmittance is dependent on the polarization of the radiation

NOTE Polarizing sunglare filters have a preferred plane of polarization. The plane of polarization is determined by the transmission direction and the magnetic vector of the transmitted electromagnetic wave.

3.7**reference points**

the reference points of eye-protectors with a focal lenses are defined in Figure 2 of EN 167:1995 by the points where the two light bundles are passing through the oculars, unless the manufacturer specifies different ones (e.g. in the case of frames for children)

the geometric centre of the ocular takes the place of the reference point if this is not known and cannot be determined by using this method 

A₂ 3.8**relative visual attenuation quotient for signal light recognition**

this quotient Q is defined as:

$$Q = \frac{\tau_{\text{sign}}}{\tau_v}$$

where

τ_v is the luminous transmittance of the sunglare filter for CIE standard illuminant D 65.
See ISO/CIE 10526:1991;

τ_{sign} is the luminous transmittance of the sunglare filter for the spectral power distribution of the traffic signal light.

these are given by the equations:

$$\tau_v = \frac{\int_{380 \text{ nm}}^{780 \text{ nm}} \tau_F(\lambda) \cdot V(\lambda) \cdot S_{D65\lambda}(\lambda) \cdot d\lambda}{\int_{380 \text{ nm}}^{780 \text{ nm}} V(\lambda) \cdot S_{D65\lambda}(\lambda) \cdot d\lambda}$$

$$\tau_{\text{sign}} = \frac{\int_{380 \text{ nm}}^{780 \text{ nm}} \tau_F(\lambda) \cdot \tau_s(\lambda) \cdot V(\lambda) \cdot S_{A\lambda}(\lambda) \cdot d\lambda}{\int_{380 \text{ nm}}^{780 \text{ nm}} \tau_s(\lambda) \cdot V(\lambda) \cdot S_{A\lambda}(\lambda) \cdot d\lambda}$$

where

$S_{A\lambda}(\lambda)$ is the spectral distribution of radiation of CIE standard illuminant A (or 3 200 K light source for blue signal light); See: ISO/CIE 10526:1991.

$S_{D65\lambda}(\lambda)$ is the spectral distribution of radiation of CIE standard illuminant D 65;
See: ISO/CIE 10526:1991.

$V(\lambda)$ is the spectral luminous efficiency for daylight vision; See: ISO/CIE 10527:1991.

$\tau_\Sigma(\lambda)$ is the spectral transmittance of the traffic signal lens;

$\tau_\Phi(\lambda)$ is the spectral transmittance of the sunglare filter.

The spectral values of the products of the spectral distributions [$S_{A\lambda}(\lambda)$, $S_{D65\lambda}(\lambda)$], of the illuminants, the spectral luminous efficiency $V(\lambda)$ of the eye and the spectral transmittance $\tau_s(\lambda)$ of the traffic signal lenses are given in Annex B **A₂**