INTERNATIONAL STANDARD

ISO 12312-1

Second edition
2022-06

Eye and face protection — Sunglasses and related eyewear —

Part 1: Sunglasses for general use

Protection des yeux et du visage — Lunettes de soleil et articles de lunetterie associés —

Partie 1: Lunettes de soleil pour usage général

Reference number
ISO 12312-1:2022(E)

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Published in Switzerland

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Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Construction and materials ... **3**
4.1 Construction ... 3
4.2 Filter material and surface quality ... 3
4.3 Physiological compatibility ... 3
4.4 Headforms ... 4

5 Transmittance ... **4**
5.1 Test methods ... 4
5.2 Transmittance and filter categories ... 4
5.3 General transmittance requirements ... 5
5.3.1 Uniformity of luminous transmittance ... 5
5.3.2 Requirements for road use and driving ... 6
5.3.3 Wide-angle scatter ... 6
5.3.4 Additional transmittance requirements for specific filter types ... 6
5.3.5 Claimed transmittance properties ... 8

6 Refractive power ... **10**
6.1 Spherical and astigmatic power ... 10
6.2 Spatial deviation ... 10
6.3 Prism imbalance (relative prism error) ... 10

7 Robustness ... **11**
7.1 Minimum robustness of filters ... 11
7.2 Frame deformation and retention of filters ... 11
7.3 Impact resistance of sunglasses, strength level 1 (optional specification) ... 11
7.4 Increased endurance of sunglasses (optional specification) ... 11
7.5 Resistance to perspiration (optional specification) ... 12
7.6 Impact resistance of sunglasses, strength level 2 or 3 (optional specification) ... 12

8 Resistance to solar radiation ... **13**

9 Resistance to ignition ... **13**

10 Resistance to abrasion (optional specification) ... **13**

11 Protective requirements ... **14**
11.1 Coverage area ... 14
11.2 Temporal protective requirements ... 14

12 Information and labelling ... **15**
12.1 Information to be supplied with each pair of sunglasses ... 15
12.2 Additional information ... 17

13 Selection of test samples ... **18**
13.1 General ... 18
13.2 Preparation and conditioning of test samples ... 18

Annex A (informative) **Use of sunglass filters** ... **21**

Annex B (informative) **Electro-optical sunglare filters** ... **23**

Annex C (normative) **Unmounted filters used as replacement or alternative filters** ... **25**

Bibliography ... **29**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 94 *Personal safety – Personal protective equipment*, Subcommittee SC 6, *Eye and face protection*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 85, *Eye-protective equipment*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 12312-1:2013), including ISO 12312-1:2013/Amd.1:2015, which has been technically revised.

The main changes compared to the previous edition are as follows:

— added a specification for the electro-optical filters;

— replaced the "local variations in refractive power" with the "spatial deviation";

— introduced the activation of photochromic lenses at 5 °C and 35 °C as optional information;

— extended the side protection to children's sunglasses mounting filter category 4 lenses.

A list of all parts in the ISO 12312 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Eye and face protection — Sunglasses and related eyewear —

Part 1: Sunglasses for general use

1 Scope

This document is applicable to all afocal (plano power) sunglasses and clip-ons for general use, including road use and driving, intended for protection against solar radiation.

Information on the use of sunglass filters is given in Annex A. Requirements for unmounted filters used as replacement or alternative filters are given in Annex C.

This document is not applicable to:

a) eyewear for protection against radiation from artificial light sources;

b) eye protectors intended for specific sports (e.g. ski goggles or other types – see ISO 18527 (all parts));

c) sunglasses that have been medically prescribed for attenuating solar radiation;

d) products intended for direct observation of the sun, such as for viewing a partial or annular solar eclipse, for which ISO 12312-2 applies;

e) products intended for occupational eye protection – see, for example, ISO 16321 (all parts).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4007, *Personal protective equipment — Eye and face protection — Vocabulary*

ISO 8980-5, *Ophthalmic optics — Uncut finished spectacle lenses — Part 5: Minimum requirements for spectacle lens surfaces claimed to be abrasion-resistant*

ISO 11664-2, *Colorimetry — Part 2: CIE standard illuminants*

ISO 12311:—[1)], *Personal protective equipment — Test methods for sunglasses and related eyewear*

ISO 18526-1:2020, *Eye and face protection — Test methods — Part 1: Geometrical optical properties*

ISO 18526-2:2020, *Eye and face protection — Test methods — Part 2: Physical optical properties*

ISO 18526-3:2020, *Eye and face protection — Test methods — Part 3: Physical and mechanical properties*

ISO 18526-4:2020, *Eye and face protection — Test methods — Part 4: Headforms*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4007 and the following apply.

1) In preparation. Stage at the time of publication, ISO/DIS 12311:2022.

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
related eyewear
eyewear intended for protection in the same wavelength range as solar radiation but not necessarily originating from the Sun

3.2
electro-optical sunglare filter
electro-optical sunglass filter
filter that varies, by electro-optical means, its luminous transmittance depending upon the illuminance and spectral bands to which it is exposed or by manual control

Note 1 to entry: The change in luminous transmittance may be under automatic or manual control, or a combination. For example, where the luminous transmittances in the faded and darkened states are set manually, and transitions between them automatically. The luminous transmittance of the filter therefore varies within certain limits in response to the illuminance.

3.3
reaction time
t_r
‹electro-optical sunglare filter› response time of an *electro-optical sunglare filter* (3.2) to darken from its luminous transmittance in the *faded state* ($\tau_{v\,0}$) towards its luminous transmittance in the darkened state ($\tau_{v\,1}$) when activated or to fade from its *darkened state* towards its *faded state.*

Note 1 to entry: The reaction time is the time taken for the filter to change its luminous transmittance from the fully darkened or faded state by 90 % of the difference between the luminous transmittances in the faded and darkened states , i.e. from $\tau_{v\,0}$ to $\{\tau_{v\,0} - 0{,}9 \times (\tau_{v\,0} - \tau_{v\,1})\}$ or from $\tau_{v\,1}$ to $\{\tau_{v\,1} + 0{,}9 \times (\tau_{v\,0} - \tau_{v\,1})\}$,

where

$\tau_{v\,0}$ is the luminous transmittance of the lens or filter in the faded state;

$\tau_{v\,1}$ is the luminous transmittance of the lens or filter in the darkened state.

Note 2 to entry: Darkening and fading times may be different.

3.4
absorption ratio
A_R
‹electro-optical sunglare filter› ratio of the luminous transmittance in the faded state to that in the darkened state

Note 1 to entry: The absorption ratio, *AR*, is calculated from the following formula:

$$A_R = \frac{\tau_{v\,0}}{\tau_{v\,1}}$$

where

$\tau_{v\,0}$ is the *luminous transmittance* of the *lens* or *filter* in the faded state;

$\tau_{v\,1}$ is the *luminous transmittance* of the *lens* or *filter* in the darkened state.

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3.5
default mode
luminous transmittance state of an *electro-optical sunglare filter* (3.2) when the power supply is disconnected or malfunctions

Note 1 to entry: The power supply can be mains electricity, a battery or a photovoltaic cell.

4 Construction and materials

4.1 Construction

When tested in accordance with ISO 18526-3:2020, 6.1, areas of the sunglass, including the frame and, if in a rimless or semi-rimless style, the edges of the filters, that may come into contact with the wearer during intended use shall be smooth and without sharp projections.

NOTE Manufacturers are recommended to use the range of screw sizes and threads used in sunglass frames as specified in ISO 11381.

4.2 Filter material and surface quality

When tested in accordance with ISO 18526-3:2020, 6.6, except in a marginal area 5 mm wide, sunglass filters shall have no material or machining defects within an area of 30 mm diameter centred on the reference point that could impair vision, e.g. bubbles, scratches, inclusions, dull spots, pitting, mould marks, notches, reinforced areas, specks, beads, water specks, pock marks, gas inclusions, splintering, cracks, polishing defects or undulations. If this 5 mm wide portion around the edge of the test sample intrudes into this circular area, then this intrusion shall be excluded from testing.

4.3 Physiological compatibility

Sunglasses shall be designed, manufactured and packaged in such way that, when used under normal conditions, they will not compromise the health or safety of the wearer. The risks posed by substances leaking or evaporating from the sunglasses that can come into prolonged contact with the wearer shall be reduced by the manufacturer to within the limit of any applicable regulatory requirement.

Special attention shall be given to substances that are allergenic, carcinogenic, mutagenic or toxic to reproduction.

NOTE 1 Excessive pressure due to a poor fit on the head, chemical irritation and allergy are known to produce reactions. Rare or idiosyncratic reactions to any material can occur and the individual wearer is well advised to avoid those types of frame materials.

Substances recommended for cleaning, maintenance or disinfection shall be known to be unlikely to have any adverse effect upon the wearer, when applied in accordance with the instructions given in the information to be supplied by the manufacturer.

Manufacturers/suppliers shall perform an appropriate risk analysis on potentially harmful substances contained in the sunglasses that, when the sunglasses are used under normal conditions, the health (and safety) of the wearer shall not be compromised.

The following are examples of documents that represent the appropriate information:

a) specification of the material(s);

b) safety data sheets relating to the materials;

c) information relating to the suitability of the materials for use in medical devices, or other relevant applications;

d) information relating to toxicological, allergenic, carcinogenic, toxic to reproduction, or mutagenic investigations on the materials.

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