

SILMA- JA NÄOKAITSEVAHENDID. KATSEMEETODID.
OSA 2: FÜÜSIKALISED OPTILISED OMADUSED

Eye and face protection - Test methods - Part 2 :
Physical optical properties (ISO 18526-2:2020)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 18526-2:2020 sisaldab Euroopa standardi EN ISO 18526-2:2020 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 18526-2:2020 consists of the English text of the European standard EN ISO 18526-2:2020.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 11.03.2020.	Date of Availability of the European standard is 11.03.2020.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 13.340.20

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:

Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

EUROPEAN STANDARD

EN ISO 18526-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2020

ICS 13.340.20

English Version

Eye and face protection - Test methods - Part 2 : Physical optical properties (ISO 18526-2:2020)

Protection des yeux et du visage - Méthodes d'essai -
Partie 2: Propriétés optiques physiques (ISO 18526-
2:2020)

Augen- und Gesichtsschutz - Prüfverfahren - Teil 2:
Physikalisch optische Eigenschaften (ISO 18526-
2:2020)

This European Standard was approved by CEN on 25 January 2020.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN ISO 18526-2:2020) has been prepared by Technical Committee ISO/TC 94 "Personal safety -- Personal protective equipment" in collaboration with 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 September 2020, and conflicting national standards shall be withdrawn at the latest by September 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 18526-2:2020 has been approved by CEN as EN ISO 18526-2:2020 without any modification.

Contents

	Page
Foreword	vii
Introduction	viii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Preparatory information	1
5 General test requirements	2
6 Test methods for measuring transmittance — General	2
6.1 Uncertainty of measurement.....	2
6.2 Reporting compliance.....	3
6.3 Applicability.....	3
6.4 Position and direction of measurement.....	3
6.5 Wavelength intervals.....	3
6.6 Test report.....	3
7 Luminous transmittance	3
7.1 Calculations of luminous transmittance from spectral values.....	3
7.2 Test report.....	3
7.3 Broadband method of measurement of luminous transmittance.....	4
7.3.1 Apparatus.....	4
7.3.2 Calibration.....	4
7.3.3 Procedure.....	4
7.3.4 Test reports for luminous transmittance values.....	4
7.4 Measurement of uniformity of luminous transmittance.....	4
7.4.1 Unmounted filter covering one eye.....	4
7.4.2 Filter covering both eyes.....	6
7.5 Transmittance matching at right and left reference points.....	9
7.5.1 Test method.....	9
7.5.2 Calculations.....	10
7.5.3 Test report.....	10
8 Ultraviolet transmittance	10
8.1 General.....	10
8.2 Spectral transmittance and mean spectral transmittance.....	10
8.3 Solar UV transmittance.....	10
8.4 Solar UV-A transmittance.....	10
8.5 Solar UV-B transmittance.....	10
8.6 Mean UV-A transmittance.....	10
8.7 Mean UV-B transmittance.....	11
8.8 Mean 380 nm to 400 nm transmittance.....	11
8.9 Test report.....	11
9 Blue-light transmittance	11
9.1 Solar blue-light transmittance.....	11
9.1.1 Calculation of solar blue-light transmittance from spectral values.....	11
9.1.2 Broadband method of measurement of solar blue-light transmittance.....	11
9.2 Blue-light transmittance from artificial sources.....	11
9.2.1 Calculation of blue-light transmittance from artificial sources from spectral values.....	11
9.2.2 Broadband method of measurement of blue-light transmittance from artificial sources.....	12
9.2.3 Test report.....	12
10 IR transmittance	12

10.1	Near IR transmittance.....	12
10.1.1	Calculation.....	12
10.2	IR-A transmittance.....	12
10.2.1	Calculation.....	12
10.3	IR-B transmittance.....	12
10.3.1	Calculation.....	12
10.4	Solar IR transmittance.....	12
10.4.1	Calculation.....	12
10.5	Test report.....	12
11	Relative visual attenuation coefficient for traffic signal light detection, Q_{signal}	13
11.1	Calculation.....	13
11.2	Test report.....	13
12	Spectral reflectance	13
12.1	Uncertainty of measurement.....	13
12.2	Position and direction of measurement.....	13
12.2.1	Specular spectral reflectance.....	13
12.2.2	Total spectral reflectance (specular included).....	13
12.2.3	Total spectral reflectance (specular excluded).....	14
12.2.4	0°/45° and 45°/0° geometry.....	14
12.3	Wavelength intervals.....	14
12.4	Test report.....	14
13	Luminous reflectance	14
13.1	Calculations.....	14
13.2	Test report.....	14
13.3	Luminous reflectance of mesh.....	14
14	Scattered light	15
14.1	Wide angle scatter.....	15
14.1.1	Principle.....	15
14.1.2	Apparatus.....	15
14.1.3	Test sample.....	16
14.1.4	Test procedure.....	16
14.1.5	Calculation.....	16
14.1.6	Test report.....	17
14.2	Narrow angle scatter.....	17
14.2.1	Principle.....	17
14.2.2	Test methods.....	18
14.2.3	Test report.....	23
15	Polarization	23
15.1	Plane of transmission.....	23
15.1.1	Apparatus.....	23
15.1.2	Test procedure.....	23
15.1.3	Test report.....	24
15.2	Polarizing efficiency.....	24
15.2.1	Principle.....	24
15.2.2	Test procedure for the spectrophotometric method.....	25
15.2.3	Test report.....	25
15.2.4	Test procedure for the broadband method.....	25
15.2.5	Test report.....	26
16	Photochromic lenses	26
16.1	Light source(s) to approximate the spectral distribution of solar radiation for air mass 2 for testing.....	26
16.1.1	Radiation source using one lamp.....	26
16.1.2	Radiation source using two lamps.....	27
16.2	Conditioning for luminous transmittance in the faded state.....	27
16.3	Measurement.....	28

16.3.1	Principle	28
16.3.2	Faded state	28
16.3.3	Darkened states	28
17	Automatic welding filters	29
17.1	General	29
17.2	Luminous transmittance in the light state	29
17.2.1	Measurement	29
17.2.2	Test report	30
17.3	Luminous transmittance in the dark state	30
17.3.1	Measurement	30
17.3.2	Test report	30
17.4	Shade number of welding filters with automatic shade number setting	30
17.4.1	Principle	30
17.4.2	Apparatus	31
17.4.3	Test procedure	31
17.4.4	Test report	31
17.5	Luminous transmittance variation over time	31
17.5.1	Principle	31
17.5.2	Apparatus	32
17.5.3	Test procedure	32
17.5.4	Test report	32
17.6	Blue-light transmittance for artificial sources	32
17.6.1	Measurement	32
17.6.2	Test report	32
17.7	Uniformity of luminous transmittance for flat filters	32
17.7.1	Filter covering both eyes	32
17.8	Angular dependence of luminous transmittance for flat filters	33
17.8.1	Principle	33
17.8.2	Apparatus	33
17.8.3	Test procedure	34
17.8.4	Test report	37
17.9	Angular dependence and uniformity of luminous transmittance for curved filters	37
17.9.1	Principle	37
17.9.2	Apparatus	37
17.9.3	Procedure	38
17.9.4	Test report	39
17.10	Transmittance matching at right and left reference points	39
17.10.1	Procedure	39
17.10.2	Test report	39
17.11	Switching time	39
17.11.1	Principle	39
17.11.2	Apparatus	39
17.11.3	Procedure	39
17.11.4	Uncertainty of measurement	40
17.11.5	Test report	40
17.12	Holding time	40
17.12.1	Principle	40
17.12.2	Apparatus	40
17.12.3	Procedure	40
17.12.4	Uncertainty of measurement	40
17.12.5	Test report	40
17.13	Manual control of dark state	40
17.13.1	Procedure	40
17.13.2	Test report	41
17.14	Optical sensitivity of welding detection	41
17.14.1	Principle	41
17.14.2	Apparatus	41
17.14.3	Measuring equipment	42

17.14.4 Trigger light source (L).....	43
17.14.5 Calibration procedure for the trigger light source (L).....	44
17.14.6 Higher intensity light source (I).....	44
17.14.7 Lower intensity light source (F).....	45
17.14.8 Test procedure.....	46
17.14.9 Test report.....	46
Annex A (normative) Application of uncertainty of measurement.....	47
Annex B (informative) Sources of uncertainty in spectrophotometry and their estimation and control.....	50
Annex C (informative) Definitions in summation form.....	58
Annex D (normative) Spectral functions for the calculation of transmittance and reflectance values.....	63
Annex E (informative) Generic description of automatic welding filters and guidance on illumination during testing.....	73
Bibliography.....	77

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 — Protective protective equipment*, Subcommittee SC 6, *Eye and face protection*.

This first edition of ISO 18526-2, together with ISO 18526-1, cancels and replaces ISO 4854:1981.

A list of all parts in the ISO 18526 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.

Introduction

This family of documents comprised of the ISO 16321 series, the ISO 18526 series and the ISO 18527 series was developed in response to the worldwide stakeholders' demand for minimum requirements and test methods for eye and face protectors traded internationally. ISO 4007 gives the terms and definitions for all the various product types. The test methods are given in the ISO 18526 series, while the requirements for occupational eye and face protectors are given in the ISO 16321 series. Eye protectors for specific sports are mostly dealt with by the ISO 18527 series. A guidance document, ISO 19734, for the selection, use and maintenance of eye and face protectors is under preparation.

This document is a preview generated by EVS

Eye and face protection — Test methods —

Part 2: Physical optical properties

1 Scope

This document specifies the reference test methods for determining the physical optical properties of personal eye and face protectors.

This document does not apply to any eye and face protection products for which the requirements standard(s) specifies other test methods.

Other test methods can be used provided they have been shown to be equivalent and include uncertainties of measurement no greater than those required of the reference method.

2 Normative references

The following documents are referred to 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/CIE 11664-1, *Colorimetry — Part 1: CIE standard colorimetric observers*

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

CIE 15:2019, *Colorimetry*

CIE S 017, *International lighting vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4007 and CIE S 017 apply.

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 <http://www.electropedia.org/>

4 Preparatory information

Before testing, refer to the appropriate product's requirements standard for the information needed to apply the tests in this document, for example:

- the number of test samples¹⁾;
- preparation of test samples;

1) For the purpose of this document, “test sample” is taken to be the object under test, e.g. “ocular”, “lens”, “filter”, or “complete protector” as specified in the requirements standard.