

This is a preview of "ISO 12311:2013". [Click here to purchase the full version from the ANSI store.](#)

First edition  
2013-08-01

Corrected version  
2013-11-15

---

---

## Personal protective equipment — Test methods for sunglasses and related eyewear

*Équipement de protection individuelle — Méthodes d'essai pour  
lunettes de soleil et articles de lunetterie associés*



Reference number  
ISO 12311:2013(E)

© ISO 2013

This is a preview of "ISO 12311:2013". [Click here to purchase the full version from the ANSI store.](#)



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

This is a preview of "ISO 12311:2013". [Click here to purchase the full version from the ANSI store.](#)

## Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Prerequisites</b> .....	<b>1</b>
<b>5 General test requirements</b> .....	<b>2</b>
<b>6 Test methods for assessing the construction and materials</b> .....	<b>2</b>
6.1 Prior assessment of construction, marking and information.....	2
6.2 Test method for assessment of filter material and surface quality.....	2
<b>7 Test methods for measuring spectrophotometric properties</b> .....	<b>3</b>
7.1 Measurement of spectral transmittance $\tau(\lambda)$ .....	3
7.2 Measurement of uniformity of luminous transmittance.....	4
7.3 Calculation of ultraviolet transmittance.....	7
7.4 Calculation of solar blue-light transmittance $\tau_{sb}$ .....	8
7.5 Calculation of solar IR transmittance $\tau_{SIR}$ .....	9
7.6 Measurement of absolute spectral reflectance $\rho(\lambda)$ .....	9
7.7 Absolute luminous reflectance $\rho_v$ .....	10
7.8 Calculation of relative visual attenuation quotient for signal light detection $Q_{signal}$ .....	11
7.9 Wide angle scatter.....	11
7.10 Polarizing filters.....	14
7.11 Photochromic filters.....	17
<b>8 Test methods for measuring optical properties</b> .....	<b>19</b>
8.1 Test method for spherical, astigmatic and prismatic refractive powers.....	19
8.2 Test method for the prism imbalance of complete sunglasses or filters covering both eyes.....	23
8.3 Test method for local variations in refractive power.....	25
<b>9 Test methods for mechanical properties</b> .....	<b>30</b>
9.1 Test method for minimum robustness of filters.....	30
9.2 Test method for impact resistance of filters, strength level 1.....	33
9.3 Test method for impact resistance of sunglasses, strength level 1.....	35
9.4 Test method for impact resistance of sunglasses, strength level 2.....	36
9.5 Test method for impact resistance of sunglasses, strength level 3.....	37
9.6 Test method for frame deformation and filter retention.....	39
9.7 Test method for increased endurance of sunglasses.....	42
9.8 Test method for resistance to solar radiation.....	46
9.9 Test method for resistance to ignition.....	48
9.10 Test for resistance to perspiration of the sunglass frame.....	48
<b>Annex A (normative) Application of uncertainty of measurement</b> .....	<b>52</b>
<b>Annex B (informative) Sources of uncertainty in spectrophotometry and their estimation and control</b> .....	<b>54</b>
<b>Annex C (informative) Definitions in summations form</b> .....	<b>61</b>
<b>Annex D (normative) Product of the energy distribution of Standard Illuminant D65 as specified in ISO 11664-2 and the spectral visibility function of the average human eye for daylight vision as specified in ISO 11664-1</b> .....	<b>65</b>
<b>Annex E (normative) Spectral functions for the calculation of solar UV and solar blue light transmittance values</b> .....	<b>66</b>
<b>Annex F (normative) Spectral distribution of solar irradiance in the infrared spectrum for the calculation of the solar infrared transmittance<sup>[7]</sup></b> .....	<b>68</b>

This is a preview of "ISO 12311:2013". [Click here to purchase the full version from the ANSI store.](#)

<b>Annex G</b> (normative) <b>Reference test headforms</b> .....	<b>70</b>
<b>Annex H</b> (normative) <b>Spectral distribution of radiation in incandescent signal lights weighted by the sensitivity of the human eye <math>V(\lambda)</math></b> .....	<b>72</b>
<b>Annex I</b> (informative) <b>Spectral distribution of radiation in LED signal lights weighted by the sensitivity of the human eye <math>V(\lambda)</math></b> .....	<b>75</b>
<b>Annex J</b> (normative) <b>Long wavelength pass filter</b> .....	<b>78</b>
<b>Annex K</b> (informative) <b>Method of variable distance for the calibration of the telescope</b> .....	<b>82</b>
<b>Annex L</b> (normative) <b>Method to correct transmittance for variations in thickness of the filter</b> .....	<b>84</b>
<b>Bibliography</b> .....	<b>85</b>

This is a preview of "ISO 12311:2013". [Click here to purchase the full version from the ANSI store.](#)

## 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. [www.iso.org/directives](http://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. [www.iso.org/patents](http://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.

The committee responsible for this document is ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 6, *Eye and face protection*.

This corrected version of ISO 12311:2013 incorporates the following correction:

- a visible XML tag has been removed from the table in Figure G.1.