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Personal eye protection — Goggles for motorcycle and moped users

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National foreword

This British Standard is the UK implementation of EN 1938:2010. It supersedes BS EN 1938:1999 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/2, Eye protection.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Personal eye protection - Goggles for motorcycle and moped users

Protection individuelle de l'oeil - Lunettes-masques pour motocyclistes et cyclomotoristes

Persönlicher Augenschutz - Schutzbrillen für Motorrad- und Mopedfahrer

This European Standard was approved by CEN on 19 June 2010.

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Contents

Page

Foreword

This document (EN 1938:2010) 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of an identical text or by endorsement, at the latest by January 2011, and conflicting national standards shall be withdrawn at the latest by January 2011.

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

This document supersedes EN 1938:1998.

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, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies requirements and test methods for goggles for use by all motorcycle and moped drivers and passengers, intended for eye-protection during the use of motorcycle and moped, both on the road and for off-road sport or leisure use, subject to the following exclusion. The goggles for official races and competitions are not included within the scope of this standard.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 165:2005, *Personal eye-protection — Vocabulary*

EN 167:2001, *Personal eye-protection — Optical test methods*

EN 168:2001, *Personal eye-protection — Non-optical test methods*

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

EN 1836:2005+A1:2007, *Personal eye-equipment — Sunglasses and sunglare filters for general use and filters for direct observation of the sun*

ISO 11664-1:2007, *Colorimetry — Part 1: CIE standard colorimetric observers*

ISO 11664-2:2007, *Colorimetry — Part 2: CIE standard illuminants*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 165:2005 and EN 1836:2005+A1:2007 apply.

4 Requirements

4.1 General

All the samples tested shall comply with the requirements of this European Standard.

Goggles can be provided with different oculars.

4.2 Design and manufacture

Goggles shall be free from projections, sharp edges or other defects which are likely to cause discomfort or injury during use. The verification of this requirement shall be made according to 5.11 and 5.12.

4.3 Materials

Any materials (or combination of materials) may be used, provided they meet the requirements of this European Standard.

No parts of the goggles which are in contact with the wearer shall be made of materials that are known to cause irritation, allergic or toxic reaction amongst a significant proportion of users.

Examples for documents which can be presented as evidence of chemical innocuousness are given in the note below.

NOTE The following list of documents is given for information and as examples of documents that can be examined when checking on the innocuousness of materials: materials specifications; safety data sheets relating to the materials; information relating to the suitability of the materials for use with food, in medical devices, or other relevant applications; information relating to toxicological, allergenic, carcinogenic, toxic to reproduction or mutagenic investigations on the materials; information relating to ecotoxicological and other environmental investigations on the materials.

The examination of documents or of the goggles shall determine whether the claim that the materials are suitable for use in the protective goggle is justified. Particular attention should be paid to the presence of plasticisers, unreacted components, heavy metals, impurities and the chemical identity of pigments and dyes.

All metallic materials which could come into prolonged contact with the skin (e.g. hinge, rim and bridge) shall be tested according to EN 1811 for nickel release. The release of nickel shall be less than 0,5 µg/cm^2/wk.

4.4 Sit and fit

Goggles shall be so designed and manufactured that they will sit securely in position on the face when used as intended, and will adapt to the shape of the wearer's face by means of contact surfaces made of soft flexible material.

The retaining strap shall be designed to be flexible or adjustable and sit securely when fitted according to the manufacturer's instructions. The retaining strap shall be capable of withstanding any stress which occurs during proper use without tearing or being permanently deformed.

The verification of this requirement shall be made according to 5.12.

4.5 Ventilation

Design measures shall exist ensuring that the inside of the goggles is ventilated during use. Such measures shall be outside the oculars' areas and shall not reduce the peripheral vision significantly. The verification of this requirement shall be made with a visual inspection according to 5.11.

When goggle are provided with opening to allow circulation of air, the vented portion shall be such that openings shall exclude spherical objects 1,5 mm in diameter or larger.

NOTE The necessary rate of air exchange and the design of the ventilation openings depend heavily on the weather, speed of driving and the individual conditions (e.g. sweating), which means that generally applicable requirements cannot be stipulated.

4.6 Optical requirements

4.6.1 Field of vision

The size of the field of vision is defined in conjunction with the appropriate head-form described in Clause 17 of EN 168:2001.

The goggles shall exhibit a minimum field of vision defined by the two ellipses in Figure 1 when placed and centred at a distance of 25 mm from the surface of the eyes of the appropriate head-form. The horizontal axis shall be parallel to and 0,7 mm below the height of the line connecting the centres of the two eyes. The plane of the ellipses shall be parallel to the back flat portion of the head-form.

The horizontal length of the ellipses shall be 32,0 mm, the vertical width of the ellipses shall be 25,0 mm. The centre distance (d) of the two ellipses shall be $d = c + 20$ mm, where c is the pupillary distance. The pupillary

distance is 64 mm for the medium head-form and 54 mm for the small head-form, or it may be specified differently by the manufacturer.

The test shall be carried out in accordance with 5.3.

Dimensions in millimetres

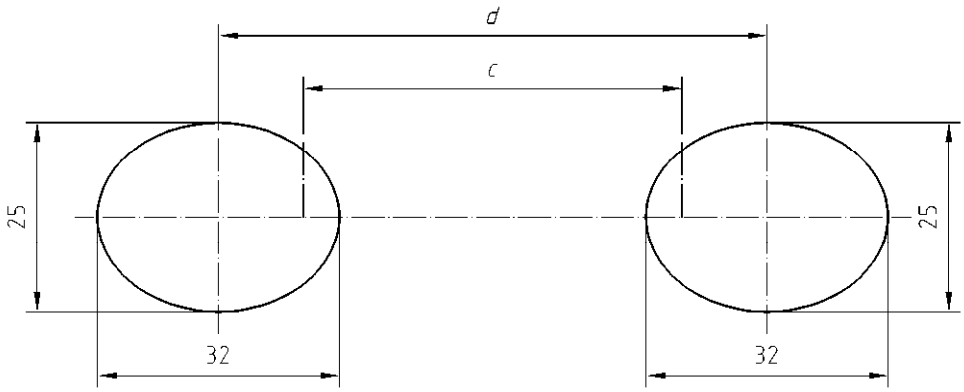


Figure 1 — Definition of the field of vision

4.6.2 Lens requirements

4.6.2.1 General

The lens requirements shall be as given in Table 1. The requirements apply to goggles with all the oculars declared by the manufacturer.

Table 1 — General requirements for lenses

	Spherical refractive power	**Astigmatic refractive power**	**Difference in prismatic refractive power** cm/m		
Permissible tolerances for refractive powers of mounted oculars	$\frac{D1+D2}{2}$ D,m^{-1}	$\lvert D1-D2 \rvert$ D,m^{-1}	Horizontal $D\Delta$		Vertical $D\Delta$
			Base out	Base in	
	± 0,12	0,12	1,00	0,25	0,25
Difference between the spherical powers of the left and right visual points	Less than 0,18 D,m^{-1}				
Luminous transmittance	According to 4.6.2.2				
Uniformity of luminous transmittance	According to 4.1.3.1 of EN 1836:2005+A1:2007				
Maximum reduced luminance coefficient	Single lens goggles: ≤ 1 cd/m²/lx Multiple lens goggles: ≤ 2 cd/m²/lx				
Quality of material and surface	According to 4.4 of EN 1836:2005+A1:2007				
Resistance to ultraviolet radiation	After the testing according to 5.7, the maximum reduced luminance coefficient shall not exceed the values shown in this table.				

4.6.2.2 Permissible transmittance and filter categories

There are three transmittance categories for oculars for goggles for motorcycle and moped users. The range of the luminous transmittance for these three categories is given by the values in Table 2. An overlap of the transmittance values of not more than ± 2 % (absolute) is permitted between the categories 0,1 and 2.

If the supplier declares a luminous transmittance value, the tolerance for the value is ± 3 % absolute for transmittance values.

When describing the transmittance properties of photochromic filters, two categories for transmittance values are generally used. These two values correspond to the faded state and to the darkened state of the filter.

In the case of gradient filters the transmittance value at the reference point is used to characterise the luminous transmittance / category of the oculars.

Table 2 also specifies the mandatory UV requirements for oculars for goggles for motorcycle and moped users.

Oculars for which the enhanced infrared absorption is claimed, shall meet the requirements of the last column of Table 2.

Table 2 — Permissible transmittance for oculars

Filter category	**Mandatory requirements**				
	Ultraviolet Spectral range			Visible Spectral range	Enhanced infrared absorption [a]
	Maximum value of spectral transmittance $\tau_F(\lambda)$		Maximum value of solar UVA transmittance $\tau_{SUVA}(\lambda)$	Range of luminous transmittance τ_V	Maximum value of solar infrared transmittance τ_{SIR}
	280 nm to 315 nm	315 nm to 350 nm	315 nm to 380 nm		
0	$0{,}1 \cdot \tau_V$	τ_V	τ_V	80 % to 100 %	τ_V
1	$0{,}1 \cdot \tau_V$	τ_V	τ_V	43 % to 80 %	τ_V
2	$0{,}1 \cdot \tau_V$	τ_V	τ_V	18 % to 43 %	τ_V

[a] Only applicable to goggles recommended by the manufacturer as a protection against infrared radiation.

In case of oculars with a luminous transmittance of less than 75 % the manufacturer shall include in the information to be supplied the warning: “Not suitable for night driving or twilight condition”.

4.6.2.3 Special transmittance requirements and claimed transmittance properties

If the oculars have special transmittance requirements and/or the claimed transmittance properties described in 4.1.3 and 4.1.4 of EN 1836:2005+A1:2007 then the oculars shall satisfy the requirements described in each corresponding clause of EN 1836:2005+A1:2007.

All oculars shall have a luminous transmittance value greater than or equal to 18 %.

4.6.2.4 Requirements for road driving

4.6.2.4.1 Recognition of signal lights

The goggles shall satisfy the requirement of the recognition of signal lights according to 4.1.3.2.3 of EN 1836:2005+A1:2007.

4.6.2.4.2 Spectral transmittance

The goggles shall satisfy the requirement of the spectral transmittance according to 4.1.3.2.2 of EN 1836:2005+A1:2007.

4.7 Non optical requirements

4.7.1 General

The requirements apply to goggles with all the oculars declared by the manufacturer. If the only difference between oculars is the colour, the compliance can be verified only on one type.

4.7.2 Impact resistance

The requirement is satisfied if the goggles withstand the impact of a steel ball, when tested in accordance with 5.8.

On so testing the following defects shall not occur:

a) ocular fracture: an ocular shall be considered to have fractured if it cracks through its entire thickness into two or more pieces, or if the ball passes through the ocular;

b) ocular deformation: an ocular shall be considered to have been deformed if a mark appears on the white paper on the opposite side to that struck by the ball;

c) ocular housing or frame fracture: an ocular housing or frame shall be considered to have failed if it separates into two or more pieces, or if it is no longer capable of holding an ocular in position, or if an unbroken ocular detaches from the frame.

4.7.3 Resistance to surface damage by fine particles

After the test described in 5.9 is made on the external face, the goggle's oculars shall have a reduced luminance coefficient of not more than 10 cd/m²/lx.

4.8 Optional requirements – Resistance to fogging

If resistance to fogging is claimed, then the oculars of the goggles shall remain free from fogging for a minimum of 30 s when tested in accordance with 5.10.

5 Testing

5.1 General

The testing schedule in Table 3 shall be applied to type testing of complete goggles for motorcycle and moped users. The sequence of testing 1 to 9 may be changed. At least 16 samples are required for testing. If additionally testing for optional requirements has to be done, more than 16 samples may be necessary.

All the samples shall pass the test.

Table 3 — Testing schedule for complete goggles for motorcycle and moped users

Order of testing	Requirements	According to Clause	Goggles number				
			1-3	4-6	7-14	15-16	17-18
1	Design and manufacture	4.2	+				
2	Sit and fit	4.4	+				
3	Ventilation	4.5	+				
4	Quality of material and surface	4.6.2	+				
5	Reduced luminance coefficient	4.6.2	+1)				
6	Transmittances, Uniformity of luminous transmittance	4.6.2	+1)				
7	Field of vision	4.6.1		+			
8	Refractive power	4.6.2		+1)			
9	Difference in prismatic refractive power	4.6.2		+			
10	Resistance to ultraviolet radiation	4.6.2	+1)				
11	Impact resistance	4.7.2			+		
12	Resistance to surface damage by fine particles	4.7.3				+2)	
13	Resistance to fogging	4.8					+2)

Explanation of the symbols: + Testing to be carried out on the indicated specimen

Empty field: No testing specified

1) Three oculars from the left and three oculars from the right eye

2) Two oculars from the left and two oculars from the right eye

5.2 Conditioning and test conditions

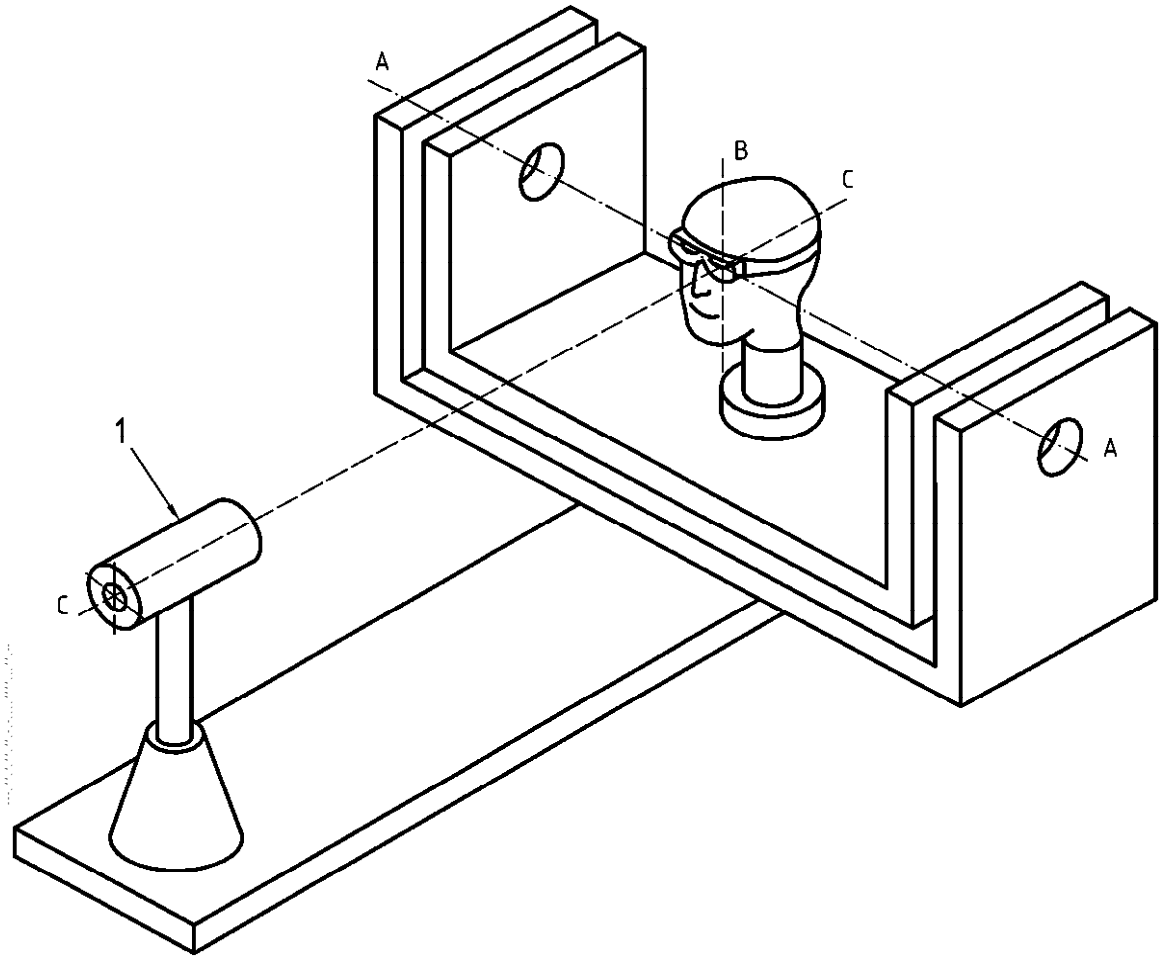
Immediately before starting the test series, the test specimen shall be conditioned for at least 4 h in an atmosphere maintained at a temperature of (23 ± 5) °C and a relative humidity of (50 ± 20) %.

Actual testing shall be carried out within 1 h after removal from the conditioning cabinet in an atmosphere maintained within the same temperature band.

5.3 Field of vision

The size of the field of vision shall be measured with a perimeter in conjunction with the medium size head-form as defined in Clause 17 of EN 168:2001. The size of the field of vision of goggles for children shall be measured with a perimeter in conjunction with the small size head-form of EN 168:2001. The goggle shall be mounted as shown in Figure 2 so that the two axes of rotation A and B and the optical axis C intersect in the front surface of one eye at the interpupillary distance.

Radiation is provided by a laser beam of (1 ± 0,5) mm diameter along axis C.



Key

1 laser
A, B, C axis (see text)

Figure 2 — Test assembly for the measurement of the field of vision

At (250 ± 5) mm distance from the surface of the eyes of the test head a transparent screen is placed centred to the middle of the eyes. On this screen the two ellipses shown in Figure 3 are drawn. The horizontal length of the ellipses shall be of 320 mm, the vertical width of the ellipses shall be of 250 mm. The centre distance of the two ellipses shall be $d' = c + (200 \pm 1)$ mm, where c is the pupillary distance. The pupillary distance is 64 mm for the medium head-form and 54 mm for the small head-form, or it may be specified differently by the manufacturer. In this case, for a pupillary distance up to 56 mm the small head-form shall be used for the test.

The horizontal axis shall be parallel to and 7 mm below the height of the line connecting the centres of the two eyes. The plane of the ellipses shall be parallel to the back flat portion of the head-form.

The arrangement is rotated around axis A and the axis B so that the circumference of the ellipse is hit by the laser beam. Such a beam shall not be shielded by the frame of the goggle. The test shall be done for both eyes.

Dimension in millimetres

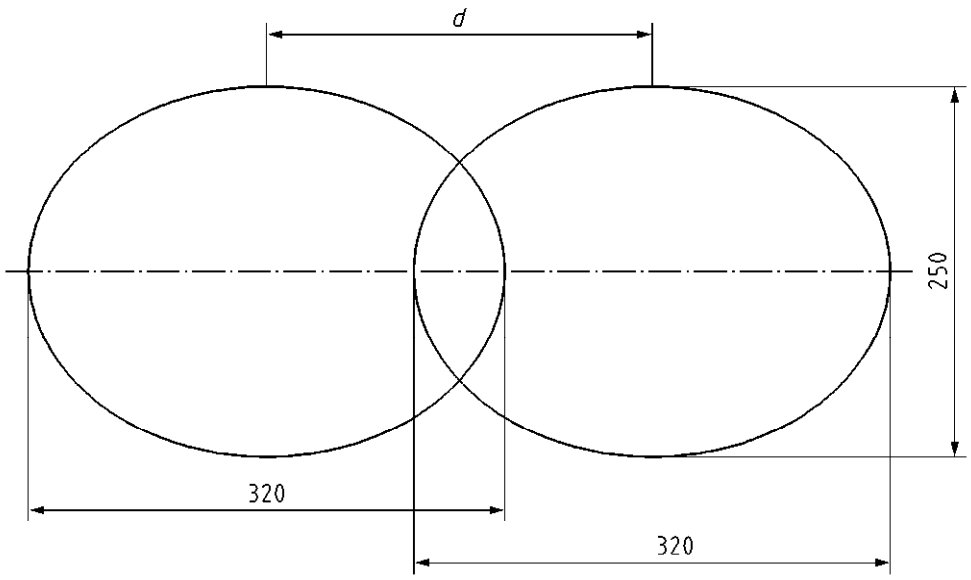


Figure 3 — Test ellipses for the measurement of the field of vision

5.4 Refractive powers

The refractive powers shall be measured in accordance with 3.2 of EN 167:2001.

5.5 Transmittance

5.5.1 General

Test methods for the determination of transmittance shall be in accordance with Clause 6 of EN 167:2001.

5.5.2 Luminous transmittance

The spectral distribution of standard illuminant D 65 according to ISO 11664-2:2007 and the standard spectral values of the colorimetric 2° standard observer according to ISO 11664-1:2007 shall be used to determine the luminous transmittance. The product of the spectral distribution of standard illuminant D 65 according to ISO 11664-2:2007 and the standard spectral values of the colorimetric 2° standard observer according to ISO 11664-1:2007 shall be as given in Annex B. Linear interpolation of these values for steps smaller than 10 nm is permissible.

5.5.3 Infrared transmittance

The infrared transmittance τ_{SIR} shall be calculated from the spectral transmittance values using the solar spectral irradiance as given in Annex D.

5.5.4 UV-transmittance

When calculating the solar UVA-transmittance τ_{SUVA} from 315 nm to 380 nm or the solar UVB-transmittance τ_{SUVB} from 280 nm to 315 nm, the step width shall not exceed 1 nm and the weighting functions of Annex C shall be used.

5.6 Reduced luminance coefficient

The reduced luminance coefficient shall be measured in accordance with one of the reference methods specified in Clause 4 of EN 167:2001.

NOTE When measuring double lenses, care should be taken to ensure that no reflections penetrate the ring opening in the case of a wedge-shape arrangement of these lenses. In cases of doubt the two lenses should be measured individually and these measured values added together.

5.7 Resistance to ultraviolet radiation

Oculars shall be subjected to the test for resistance to ultraviolet radiation in accordance with the method specified in Clause 6 of EN 168:2001 with the following differences:

a) new lamps shall be burned in for at least 150 h;

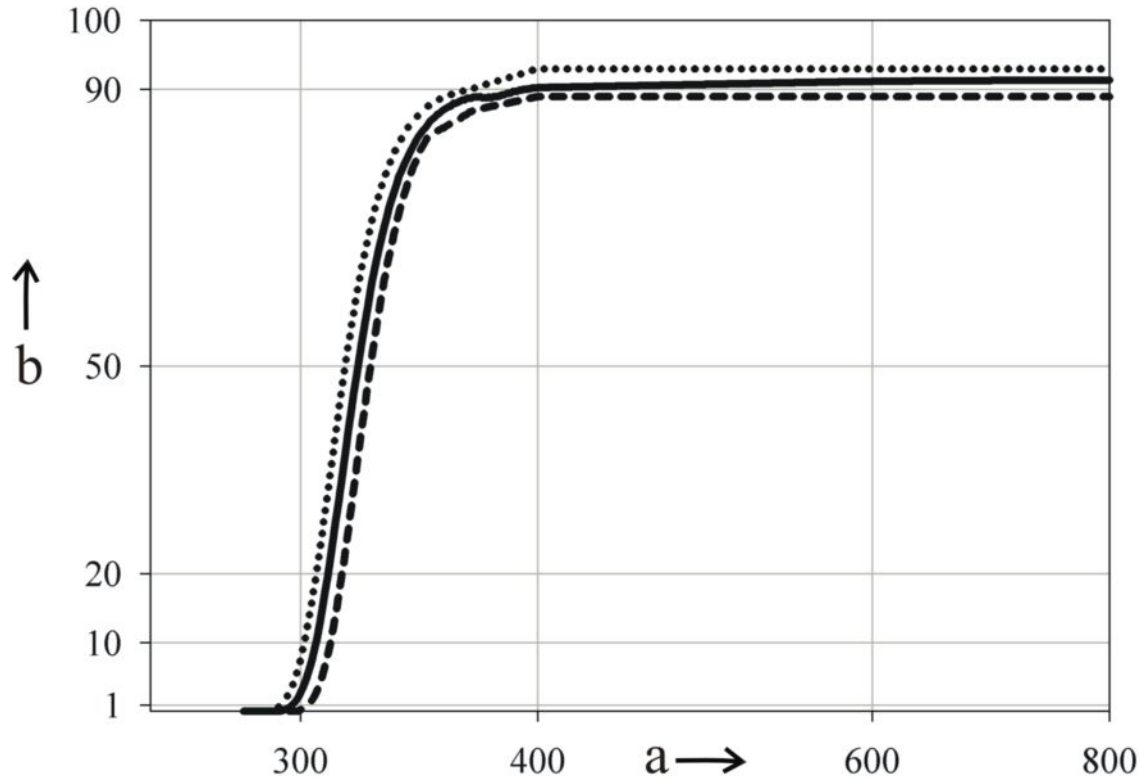
b) a lamp shall not be used for operation times longer than 2 000 h;

c) the irradiation time shall be (50 ± 0,1) h;

d) the lamp shall be ozone free;

e) a cut-on filter (e.g. a clear white crown glass B 270 with a thickness of 4 mm) shall be placed between the lamp and the specimen. This filter's spectral characteristics shall be as given in Annex E. The spectral transmittance curve of this filter is shown in Figure 4;

f) the lamp current shall be stabilized at (25 ± 0,2) A.



Key

a wavelength in nm
b spectral transmittance

solid line : nominal value
dotted line: upper limit
dashed line: lower limit

Figure 4 — Spectral transmittance of cut-on filter

NOTE The nominal position of the absorption edge is λc = 320 nm, defined by $\tau(\lambda c)$ = 46 %, a shift of ± 5 nm is permitted by the specified transmittance bands (Annex E).

5.8 Impact resistance

Goggles shall be tested in accordance with the method specified in Clause 9 of EN 168:2001 except for the following deviations:

a) the 6 mm steel ball shall be projected at the oculars with a speed of:

1) minimum protection level: ($45\ ^{+2}_{-0}$) m/s;

2) enhanced protection level: ($60\ ^{+2}_{-0}$) m/s.

NOTE The recommended fields of application for these protection levels are shown in Annex F (informative).

b) the impact test shall be carried out on two points as defined in 3.2.3. of EN 168:2001:

1) left eye frontal;

2) right eye frontal;

c) four samples (each consisting of a pair of goggles) shall be conditioned in air at 50 °C for 2 h and four additional samples shall be conditioned in air at -10 °C for 2 h;

d) the impact of the steel ball on the goggles shall take place within 30 s after the removal of the sample from the corresponding atmosphere described in point c) of 5.8;

e) the test shall be made at an ambient temperature of (23 ± 5) °C;

f) new specimens shall be used for this test and each specimen shall only be subjected to one impact.

5.9 Resistance to surface damage by fine particles

Oculars shall be subjected to the test for “resistance to surface damage by fine particles” in accordance with the method specified in Clause 15 of EN 168:2001.

5.10 Resistance to fogging

Oculars shall be subjected to the test for “resistance to fogging” in accordance with the method specified in Clause 16 of EN 168:2001.

5.11 Visual inspection

Visual inspection of each goggle shall be carried out with normal or corrected vision, without magnification, prior to the laboratory and the practical performance tests. The visual inspection shall include the assessment of the goggle, marking and information supplied by the manufacturer and any safety data sheets (if applicable) or declarations relevant to the materials used in its construction.

5.12 Sit and fit

One goggle shall be adjusted appropriately and donned by two different test subjects. With worn goggle the following actions shall be undertaken, starting from a standing position:

— turn head left and right;

— tilt head back and forward;

— standing jump on the spot five times.

Note any significant discomfort or insecurity of the fit of the goggle.

The test shall be performed without helmet. If manufacturer declares or recommends some specific helmet, the test shall be carried out with that helmet.

6 Information supplied by the manufacturer

The following information shall be supplied by the manufacturer at least in the official language(s) of the Member State of destination.

This information shall be supplied with each goggle in the form of a notice, or markings on the frame, or on the packaging, or a label affixed to the goggle or any combinations thereof:

a) name and address of the manufacturer;

b) number of this European Standard and the date of its publication;

c) model identification number;

d) specification of the field of use: goggles for all kind of motorcycle and moped activities except official races and competitions;

e) in the case of oculars that do not meet the requirements of spectral transmittance and/or recognition of signal lights, according to 4.6.2.4, the following warning: “Not suitable for driving and road use”;

f) instruction for storage, use and maintenance;

g) specific instructions for cleaning and disinfection;

h) details of the field of use, protection capabilities and performance characteristics (filter category number; warning against night driving, when appropriate; warning for off road use only, when appropriate; pupillary distance; for oculars with a luminous transmittance of less than 75 % the warning: “Not suitable for night driving or twilight condition”);

i) details of suitable accessories and spare parts and instruction for fitting;

j) the significance of the markings;

k) a warning that scratched or damaged oculars should be replaced.

7 Marking

The markings described below shall be permanently attached on the product itself or printed on a label permanently affixed to it, and shall remain visible and legible during the useful life of the product:

a) number and the year of this European Standard;

b) identification of the manufacturer;

c) model designation;

d) either of the symbols shown in Figure 5 for goggles which do not comply with 4.6.2.4.

ISO 7000-08-022 Version A

ISO 7000-08-022 Version B

Figure 5 — Symbol “not suitable for road use”

Annex A
(normative)

Photochromic sunglare oculars for use in twilight or at night

In reduced light, sunglare oculars intended for bright daylight reduce visual perception. The lower the luminous transmittance value of the sunglare ocular, the more vision is impaired.

Sunglare oculars with a luminous transmittance of less than 75 % are not suitable for use in twilight or at night.

Photocromic sunglare oculars are considered suitable for use in twilight or at night if they reach a luminous transmittance of more than 75 % after testing as follows:

a) photochromic sunglare oculars are conditioned according to 6.2.3.1.1 of EN 1836:2005+A1:2007;

b) after a), photochromic sunglare oculars are then exposed to (50 000 ± 3 000) lux at (23 ± 1) °C for 15 min;

c) after b), photochromic sunglare oculars are then stored in the dark at (23 ± 1)°C for 60 min.

Annex B
(normative)

Spectral functions for the calculation of luminous transmittance and relative visual attenuation coefficients (quotients)

Table B.1 — Product of the spectral distribution of radiation of the signal lights and standard illuminant D 65 as specified in ISO 11664-2:2007 and the spectral visibility function of the average human eye for daylight vision as specified in ISO 11664-1:2007

Wavelength λ nm	$S_{A\tau}(\lambda) \times V(\lambda) \cdot \tau_S(\lambda)$				$S_{D65\lambda}(\lambda) \times V(\lambda)$
	red	yellow	green	blue [a]	
380	0	0	0	0,000 1	0
390	0	0	0	0,000 8	0,000 5
400	0	0	0,001 4	0,004 2	0,003 1
410	0	0	0,004 7	0,019 4	0,010 4
420	0	0	0,017 1	0,088 7	0,035 4
430	0	0	0,056 9	0,352 8	0,095 2
440	0	0	0,128 4	0,867 1	0,228 3
450	0	0	0,252 2	1,596 1	0,420 7
460	0	0	0,485 2	2,638 0	0,668 8
470	0	0	0,902 1	4,040 5	0,989 4
480	0	0	1,671 8	5,902 5	1,524 5
490	0	0	2,997 6	7,886 2	2,141 5
500	0	0	5,355 3	10,156 6	3,343 8
510	0	0	9,083 2	13,056 0	5,131 1
520	0	0,181 7	13,018 0	12,836 3	7,041 2
530	0	0,951 5	14,908 5	9,663 7	8,785 1
540	0	3,279 4	14,762 4	7,206 1	9,424 8
550	0	7,518 7	12,468 7	5,780 6	9,792 2
560	0	10,734 2	9,406 1	3,254 3	9,415 6
570	0	12,053 6	6,328 1	1,397 5	8,675 4
580	0,428 9	12,263 4	3,896 7	0,848 9	7,887 0
590	6,628 9	11,660 1	2,164 0	1,015 5	6,354 0
600	18,238 2	10,521 7	1,127 6	1,002 0	5,374 0
610	20,382 6	8,965 4	0,619 4	0,639 6	4,264 8
620	17,654 4	7,254 9	0,296 5	0,325 3	3,161 9
630	13,291 9	5,353 2	0,048 1	0,335 8	2,088 9
640	9,384 3	3,735 2	0	0,969 5	1,386 1
650	6,069 8	2,406 4	0	2,245 4	0,810 0

Wavelength λ nm	$S_{A\tau}(\lambda) \times V(\lambda) \cdot \tau_S(\lambda)$				$S_{D65\lambda}(\lambda) \times V(\lambda)$
	red	**yellow**	**green**	**blue** [a]	
660	3,646 4	1,441 8	0	1,359 9	0,462 9
670	2,005 8	0,789 2	0	0,630 8	0,249 2
680	1,114 9	0,437 6	0	1,216 6	0,126 0
690	0,559 0	0,219 1	0	1,149 3	0,054 1
700	0,290 2	0,113 7	0	0,712 0	0,027 8
710	0,153 3	0,060 1	0	0,391 8	0,014 8
720	0,074 2	0,029 0	0	0,205 5	0,005 8
730	0,038 6	0,015 2	0	0,104 9	0,003 3
740	0,023 2	0,008 9	0	0,051 6	0,001 4
750	0,007 7	0,003 0	0	0,025 4	0,000 6
760	0,004 5	0,001 7	0	0,012 9	0,000 4
770	0,002 2	0,000 9	0	0,006 5	0
780	0,001 0	0,000 4	0	0,003 3	0
Sum	**100**	**100**	**100**	**100**	**100**

[a] For blue signal light the spectral distribution for 3 200 K is used instead of standard illuminant A.

Annex C
(normative)

Spectral functions for the calculation of solar UV transmittance values

This annex contains the spectral functions for the calculation of solar UV-transmittance values.

For the spectral distribution of solar radiation $E_{S\lambda}(\lambda)$ the values are taken from MOON, P., "Proposed standard solar-radiation curves for engineering use", *Journal of Franklin Institute*, vol. 230, issue 5 (November 1940), pp. 583-617. These values extend to 295 nm and are interpolated where necessary. Between 280 nm and 290 nm the irradiance values are so low that they can be set to 0 for all practical purposes.

The spectral distribution of the relative spectral effectiveness function for UV radiation $S(\lambda)$ is taken from ACGIH, 1993-1994, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, ISBN 0936712996.

The complete weighting function for the calculation of the different UV-transmittance values is the product of the relative spectral effectiveness function for UV radiation $S(\lambda)$ and the spectral distribution of solar radiation $E_{S\lambda}(\lambda)$:

$$W_\lambda(\lambda) = E_{s\lambda}(\lambda) \times S(\lambda)$$

This weighting function is also given in Table C.1.

Table C.1 — Spectral functions for the calculation of solar UV-transmittance values

Wavelength λ nm	Solar spectral irradiation $E_{s\lambda}$ $10^6 W \cdot m^{-3}$	Relative spectral effectiveness function S	Weighting function $W\lambda = E_{s\lambda} \cdot S$
280	0	0,88	0
285	0	0,77	0
290	0	0,64	0
295	$2,09 \cdot 10^{-4}$	0,54	0,000 11
300	$8,10 \cdot 10^{-2}$	0,30	0,024 3
305	1,91	0,060	0,115
310	11,0	0,015	0,165
315	30,0	0,003	0,090
320	54,0	0,001 0	0,054
325	79,2	0,000 50	0,040
330	101	0,000 41	0,041
335	128	0,000 34	0,044
340	151	0,000 28	0,042
345	170	0,000 24	0,041
350	188	0,000 20	0,038
355	210	0,000 16	0,034
360	233	0,000 13	0,030
365	253	0,000 11	0,028
370	279	0,000 093	0,026
375	306	0,000 077	0,024
380	336	0,000 064	0,022

Annex D
(normative)

Spectral function for the calculation of infrared transmittance

Table D.1 — Spectral distribution of solar irradiance in the infrared spectrum for the calculation of the solar infrared transmittance

Wavelength λ nm	Solar spectral irradiance $E_{s\lambda}$ $10^6\ W \cdot m^{-3}$	Wavelength λ nm	Solar spectral irradiance $E_{s\lambda}$ $10^6\ W \cdot m^{-3}$	Wavelength λ nm	Solar spectral irradiance $E_{s\lambda}$ $10^6\ W \cdot m^{-3}$
780	907	1 200	373	1 620	194
790	923	1 210	402	1 630	189
800	857	1 220	431	1 640	184
810	698	1 230	420	1 650	173
820	801	1 240	387	1 660	163
830	863	1 250	328	1 670	159
840	858	1 260	311	1 680	145
850	839	1 270	381	1 690	139
860	813	1 280	382	1 700	132
870	798	1 290	346	1 710	124
880	614	1 300	264	1 720	115
890	517	1 310	208	1 730	105
900	480	1 320	168	1 740	97,1
910	375	1 330	115	1 750	80,2
920	258	1 340	58,1	1 760	58,9
930	169	1 350	18,1	1 770	38,8
940	278	1 360	0,66	1 780	18,4
950	487	1 370	0	1 790	5,70
960	584	1 380	0	1 800	0,92
970	633	1 390	0	1 810	0
980	645	1 400	0	1 820	0
990	643	1 410	1,91	1 830	0
1 000	630	1 420	3,72	1 840	0
1 010	620	1 430	7,53	1 850	0
1 020	610	1 440	13,7	1 860	0
1 030	601	1 450	23,8	1 870	0

Table D.1 *(continued)*

Wavelength	Solar spectral irradiance	Wavelength	Solar spectral irradiance	Wavelength	Solar spectral irradiance
λ	$E_{s\lambda}$	λ	$E_{s\lambda}$	λ	$E_{s\lambda}$
nm	10^6 W · m^{-3}	nm	10^6 W · m^{-3}	nm	10^6 W · m^{-3}
1 040	592	1 460	30,5	1 880	0
1 050	551	1 470	45,1	1 890	0
1 060	526	1 480	83,7	1 900	0
1 070	519	1 490	128	1 910	0,705
1 080	512	1 500	157	1 920	2,34
1 090	514	1 510	187	1 930	3,68
1 100	252	1 520	209	1 940	5,30
1 110	126	1 530	217	1 950	17,7
1 120	69,9	1 540	226	1 960	31,7
1 130	98,3	1 550	221	1 970	37,7
1 140	164	1 560	217	1 980	22,6
1 150	216	1 570	213	1 990	1,58
1 160	271	1 580	209	2 000	2,66
1 170	328	1 590	205		
1 180	346	1 600	202		
1 190	344	1 610	198		

Annex E
(normative)

Cut-on filter for UV filtering

The radiation emitted by the lamp used in 5.7 for the test of resistance to radiation shall be filtered by a cut-on filter with a transmittance curve lying in the wavelength band as specified by the upper and lower limit defined by Table E.1. The nominal position of the absorption edge of this filter is $\tau_{46\%}$ = 320 nm. A suitable filter for this purpose is a 4 mm thick clear white crown glass B 270[1)].

Table E.1 — Spectral characteristics for filtering the UV radiation for the test of resistance to radiation

Wavelength λ nm	Spectral transmittance τ %		
	Lower limit	Nominal value	Upper limit
280,0	< 0,1	< 0,1	< 0,1
287,0			< 0,1
288,0			0,1
289,0			0,2
290,0			0,3
291,0		< 0,1	0,5
292,0		0,1	0,7
293,0		0,2	1,0
294,0		0,3	1,5
295,0		0,5	2,1
296,0		0,7	2,8
297,0	< 0,1	1,1	3,7
298,0	0,1	1,5	4,9
299,0	0,2	2,1	6,1
300,0	0,3	2,8	7,6
301,0	0,5	3,6	9,3
302,0	0,8	4,7	11,2
303,0	1,1	5,9	13,4
304,0	1,6	7,3	15,6
306,0	3,0	10,7	20,5
307,0	4,0	12,7	23,2
308,0	5,2	14,9	26,0
309,0	6,6	17,2	28,8
310,0	8,1	19,6	31,7
311,0	9,9	22,1	34,5
312,0	11,9	24,7	37,4
313,0	14,0	27,4	40,2
314,0	16,3	30,1	42,9
315,0	18,7	32,8	45,7
316,0	21,3	35,5	48,2
317,0	24,0	38,2	50,8
318,0	26,7	41,0	53,3
319,0	29,5	43,5	55,6
320,0	32,3	46,2	57,9
321,0	35,1	48,7	60,0
322,0	37,9	51,1	62,1
323,0	40,8	53,5	64,1
324,0	43,5	55,7	65,9
326,0	48,7	60,0	69,3
327,0	51,3	61,9	70,9
328,0	53,7	63,7	72,4
329,0	55,9	65,5	73,7
330,0	58,1	67,2	74,9
331,0	60,3	68,7	76,1
332,0	62,3	70,2	77,1
333,0	64,1	71,6	78,2
334,0	65,9	72,9	79,1
335,0	67,6	74,1	79,9
336,0	69,3	75,2	80,8
337,0	70,7	76,3	81,6
338,0	72,1	77,4	82,3
339,0	73,4	78,2	82,9
340,0	74,7	79,1	83,5
341,0	75,8	79,9	84,1
342,0	76,9	80,5	84,6
343,0	77,9	81,3	85,1
344,0	78,9	82,0	85,6

[1)] Schott B270 is an example of a suitable product available commercially. This information is given for the convenience of users of this standard and does not constitute an endorsement by CEN of this product.

Table E.1 *(continued)*

Wavelength λ nm	Spectral transmittance τ %		
	Lower limit	Nominal value	Upper limit
305,0	2,2	8,9	18,0
346,0	80,4	83,2	86,3
347,0	81,3	83,6	86,7
348,0	81,9	84,1	87,0
349,0	82,6	84,5	87,3
350,0	83,2	84,9	87,5
351,0	83,4	85,5	87,9
352,0	83,6	85,7	88,0
353,0	83,8	86,0	88,2
354,0	84,0	86,4	88,4
355,0	84,2	86,6	88,6
356,0	84,4	86,9	88,8
357,0	84,5	87,1	88,9
358,0	84,7	87,3	89,0
359,0	84,9	87,5	89,2
360,0	85,1	87,6	89,3
361,0	85,3	88,0	89,4
362,0	85,5	88,0	89,5
363,0	85,7	88,2	89,6

Wavelength λ nm	Spectral transmittance τ %		
	Lower limit	Nominal value	Upper limit
325,0	46,1	57,8	67,7
364,0	85,8	88,3	89,7
365,0	86,1	88,5	89,8
366,0	86,3	88,5	89,8
367,0	86,4	88,7	89,9
368,0	86,7	88,7	90,0
369,0	86,8	88,8	
370,0	87,0	88,9	
371,0		88,9	
372,0		88,9	
373,0		89,0	
374,0		88,8	
375,0		88,8	
376,0		88,8	
377,0		88,9	
378,0		88,8	
379,0		89,0	
380,0		89,0	
381,0		89,0	

Wavelength λ nm	Spectral transmittance τ %		
	Lower limit	Nominal value	Upper limit
345,0	79,7	82,6	85,9
382,0		89,1	
383,0		89,2	
384,0		89,2	91,0
385,0		89,4	
386,0		89,5	
387,0		89,5	
388,0		89,7	
389,0		89,7	
390,0		89,7	
391,0		89,9	
392,0		89,9	
393,0		90,0	
394,0		90,0	
395,0		90,1	
396,0		90,1	
397,0		90,2	
398,0		90,2	
399,0		90,2	
400,0	89,0	90,3	93,0
600,0		91,2	
800,0	89,0	91,4	93,0

NOTE Transmittance values between specified wavelength positions may be calculated by linear interpolation.

Annex F
(informative)

Impact resistance level

Use recommendations

Protection Level	Description
Minimum	Recommended for road use
Enhanced	Recommended for sport and leisure use

Annex G
(informative)

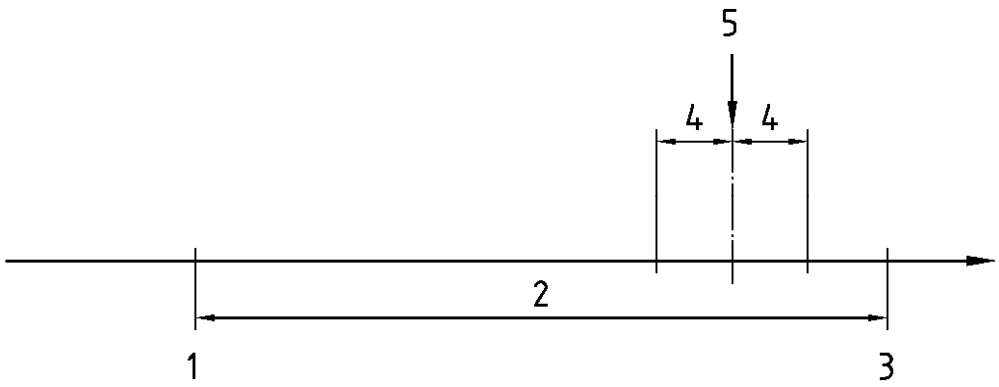
Uncertainty of measurement and results interpretation

For each of the required measurements performed in accordance with this standard, a corresponding estimate of the uncertainty of measurement shall be evaluated.

This estimate of uncertainty shall be applied and stated when reporting test results, in order to enable the user of the test report to assess the reliability of the data.

The following protocol with regard to uncertainty of measurement shall be applied to test results:

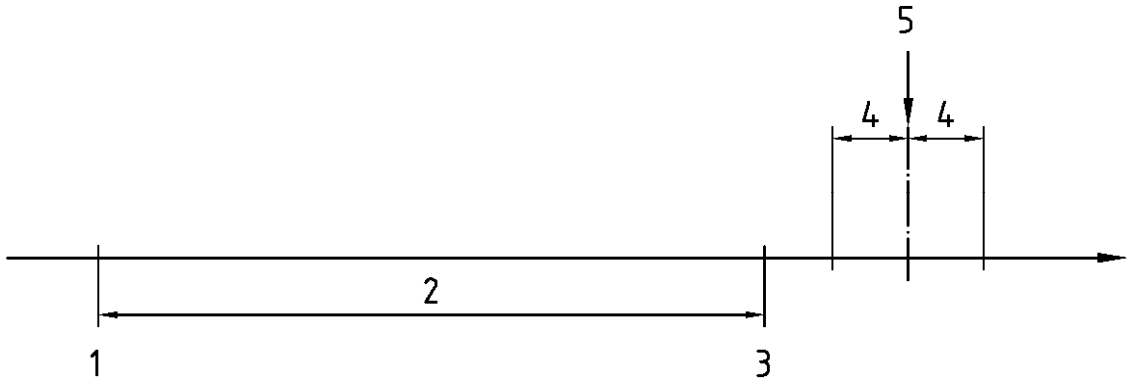
If the limit value for the particular test given in the standard, falls outside of the range of values calculated from the test data plus/minus the uncertainty U of measurement, then the result shall be deemed to be a straightforward pass or fail (Figures G.1 and G.2).



Key

1 lower specification limit (LSL)
2 specification zone
3 upper specification limit (USL)
4 uncertainty of measurement (U)
5 result of a measurement

Figure G.1 — Result pass

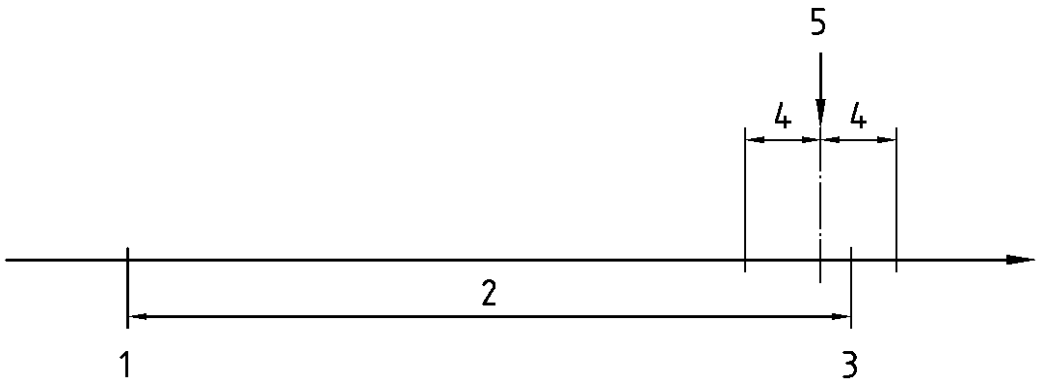


Key

1 lower specification limit (LSL)
2 specification zone
3 upper specification limit (USL)
4 uncertainty of measurement (U)
5 result of a measurement

Figure G.2 — Result fail

If the limit value for the particular test given in the standard, falls within the range of values calculated from the test data plus/minus the uncertainty U of measurement, then the assessment of passor fail shall be determined on the basis of safety, that is considering the safest conditions for the user of the PPE (Figure G.3).



Key

1 lower specification limit (LSL)
2 specification zone
3 upper specification limit (USL)
4 uncertainty of measurement (U)
5 result of a measurement

Figure G.3 — Result fail

Annex H
(informative)

Significant technical changes between this European Standard and the previous edition

Clause, paragraph, table, figure	Change
1 Scope	The scope has been modified to include all the goggles used by all motorcycle and moped users, both on the road and for off-road sport or leisure. Previous standard excluded the off-road use.
4.3 Materials	The clause has been extended to take into account the indication of the European Commission.
4.5 Ventilation	A clarification to better evaluate eventual opening has been added.
4.6.1 Field of vision	The specification of previous standard regarding “4.5 Dimensions” has been reformulated with the new subclause 4.5.1 to harmonize the specification with the same of EN 174.
4.6.2. Lens requirements Table 1	A specification regarding the difference between the spherical powers of the left and right visual points has been added.
4.6.2.2 Oculars requirements Table 2	The limit of the transmittance of the oculars for night driving has been changed from 80 % to 75 %.
4.6.2.4 Requirements for road driving	The specifications “Recognition of signal light” and “Spectral transmittance” have been cut from Table 1. A specific subclause for “Road driving” has been created.
4.7.3 Resistance to surface damage by fine particles	The maximum value of the reduced luminance coefficient has been changed from 12 cd/m²/lx to 10 cd/m²/lx.
4.8 Resistance to fogging	The time without misting of oculars has been increased from 15 s to 30 s.
5 Testing	All the clauses have been renumbered taking into consideration the new clauses that have been added.
5.1 General	This clause, which includes Table 3, has been added to underline the number of the samples have to be tested by the Notified Bodies and the allocation of the test.
5.2 Conditioning and test conditions	Specifications on conditioning and test conditions are introduced.
5.3 Field of vision (Testing)	The test has been harmonized with the same of EN 174 and the number of the clause has been changed from 5.1 to 5.3.
5.5 Transmittance (Testing)	The test has been harmonized with the same of EN 1836:2005+A1:2007 and the number of the clause has been changed from 5.3 to 5.5.
5.5 Resistance to ultraviolet radiation (Testing)	The test has been harmonized with the same of EN 1836:2005+A1:2007 and the number of the clause has been changed from 5.5 to 5.7.
5.8 Impact resistance (Testing)	An enhanced level has been added to better cover the requirements for use of goggle in sport and leisure activities. The number of samples to test has been changed from three to four. The time between the conditioning and the test has been changed from 50 s / 60 s to maximum 30 s. The number of impact for each samples has been better specified. The number of the clause has been changed from 5.6 to 5.8.
5.11 Visual inspection (Testing)	This new subclause has been added to better define the test method.
5.12 Sit and fit (Testing)	This new subclause has been added to better define the test method.

6 Information supplied by the manufacturer	Changes have been made to take into account of the modifications introduced in the revision.
7 Marking	Changes have been made to take into account the modifications introduced in the revision. The symbols for the warning “not suitable on road use" have been replaced with the two pictograms standardized by ISO.
NOTE The technical changes referred include the significant technical changes from the EN revised but is not an exhaustive list of all modifications from the previous version.	

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC – Personal Protective Equipment

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 89/686/EEC – Personal Protective Equipment.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 89/686/EEC

Clause(s)/sub-clause(s) of this Standard	Essential Requirements (ERs) of Directive 89/686/EEC		Qualifying remarks/Notes
	1.1	**Design principles**	
4.4	1.1.1	Ergonomics	
	1.1.2	Levels and classes of protection	
4.4	1.1.2.1	Highest level of protection possible	
4.6.2.2; 4.7.2	1.1.2.2	Classes of protection appropriate to different levels of risk	
	1.2	**Innocuousness of PPE**	
	1.2.1	Absence of risk and other 'inherent' nuisance factors	
4.3	1.2.1.1	Suitable constituent materials	
4.2	1.2.1.2	Satisfactory surface condition of all PPE parts in contact with the user	
4.4; 4.6.2.3; 4.7.3	1.2.1.3	Maximum permissible user impediment	
	1.3	**Comfort and efficiency**	
4.4	1.3.1	Adaptation of PPE to user morphology	
4.4; 4.6.1;	1.3.2	Lightness and design strength	
6	**1.4**	**Information supplied by the manufacturer**	
4.4	**2.1**	**PPE incorporating adjustment systems**	
4.5	**2.2**	**PPE 'enclosing' the parts of the body to be protected**	
4.6.1; Table 1; 4.5	**2.3**	**PPE for the face, eyes and respiratory tracts**	
7	**2.12**	**PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety**	
	3.1	**Protection against mechanical impact**	
4.7.2	3.1.1	Impact caused by falling or projecting objects and collision of parts of the body with an obstacle	
	3.9	**Radiation protection**	
4.6.2.2; 4.6.2.4; Table 1	3.9.1	Non-ionizing radiation	

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] EN 174, *Personal eye-protection — Ski goggles for downhill skiing*

[2] ISO 7000:2004, *Graphical symbols for use on equipment — Index and synopsis*

[3] MOON, P., "Proposed standard solar-radiation curves for engineering use", *Journal of Franklin Institute*, vol. 230, issue 5 (November 1940), pp. 583-617

[4] American Conference of Governmental and Industrial Hygenists (ACGIH) 1993-1994, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices* (Cincinnati:ACGIH), ISBN 0936712996

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