



Australian/New Zealand Standard

Personal eye protection

Part 0: Eye and face protection—Vocabulary

Superseding AS/NZS 1337.0(Int):2010

AS/NZS 1337.0:2014



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Australian/New Zealand Standard

Personal eye protection

Part 0: Eye and face protection—Vocabulary

Originated as AS/NZS 1337.0(Int):2010.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee SF-006, Eye and Face Protection, to supersede AS/NZS 1337.0(Int):2010, *Personal eye protection, Part 0: Eye and face protectors—Vocabulary*.

The objective of this Standard is to provide terms and definitions for eye and face protectors. Additional terms specifically used in AS/NZS 1337.1, which are not defined in this Standard, are defined in AS/NZS 1337.1.

This Standard is an adoption with national modifications and has been reproduced from ISO 4007:2012, *Personal protective equipment—Eye and face protection—Vocabulary*, and has been varied as indicated to take account of Australian/New Zealand conditions. The modifications are specified in Appendix ZZ.

As this Standard is reproduced from an International Standard, the following applies:

- (a) In the source text 'this International Standard' should read 'this Australian/New Zealand Standard'.
- (b) A full point substitutes for a comma when referring to a decimal marker.

The terms 'normative' and 'informative' are used to define the application of the annex or appendix to which they apply. The 'normative' appendix is an integral part of a Standard, whereas the 'informative' annex is only for information and guidance.

New Zealand NOTE –

In reproducing this joint standard adopted from ISO 4007:2012 the non-English text has been removed (except for tables and figures). Some repagination has also been done to minimise blank columns in the standard.

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INTRODUCTION

This International Standard is based on EN 165, *Personal eye-protection — Vocabulary*, which has been withdrawn.

Although considered, there is no definition describing transmittance or absorptance properties of filters in the short-wavelength range from 380 nm to around 400 nm because there is no agreement at present on what the definition or requirement should be.

Terms relating to mesh visors and additional oculars have been omitted until required for the appropriate standards.

Words in bold within descriptions or notes refer to terms defined within this International Standard.

AUSTRALIAN/NEW ZEALAND STANDARD

Personal eye protection**Part 0:****Eye and face protection—Vocabulary (ISO 4007:2012, MOD)****1 Scope**

This International Standard defines and explains the principal terms used in the field of personal eye and face protection.

NOTE This International Standard includes terms reproduced from the standards cited in Clause 2. At the time of publication of this International Standard, the quoted terms are identical to those in ISO 8624:2011, ISO 13666:—¹⁾, CIE 17.4:1987 and ISO/IEC Guide 51:1999. If, due to future revision of the aforementioned standards, there should be a disagreement between ISO 4007 and ISO 8624, ISO 13666, CIE 17.4 or ISO/IEC Guide 51, then the definitions in the latest version of ISO 8624, ISO 13666, CIE 17.4 or ISO/IEC Guide 51 take precedence.

1) To be published.

2 Terms relating to hazards**2.1 safety**

freedom from unacceptable **risk** (2.4)

[ISO/IEC Guide 51:1999]

NOTE The use of the words “safety” and “safe” as descriptive words should be avoided because they convey no useful extra information. In addition, they are likely to be interpreted as an assurance of guaranteed freedom from risk. The recommended approach is to replace, wherever possible, the words “safety” and “safe” by an indication of the objective.

EXAMPLE Use “protective helmet” instead of “safety helmet”.

2.2 harm

physical injury or damage to the health of people, or damage to property or the environment

[ISO/IEC Guide 51:1999]

2.3 hazard

potential source of **harm** (2.2)

NOTE The term hazard can be qualified in order to define its origin or the nature of the expected harm (e.g. electric shock hazard, crushing hazard, cutting hazard, toxic hazard, fire hazard, drowning hazard).

[ISO/IEC Guide 51:1999]

2.4 risk

combination of the probability of occurrence of **harm** (2.2) and the severity of that harm

[ISO/IEC Guide 51:1999]

2.5 reasonably foreseeable misuse

use of a product, process or service in a way not intended by the supplier, but which may result from readily predictable human behaviour

[ISO/IEC Guide 51:1999]

3 Terms relating to optical radiation and sources of radiation**3.1 Terms relating to optical radiation****3.1.1 optical radiation**

electromagnetic radiation at wavelengths between the region of transition to X-rays ($\lambda \approx 1$ nm) and the region of transition to radio waves ($\lambda \approx 1$ mm)

[CIE DS 017.1:2009]

NOTE This is usually subdivided into the following spectral ranges, with a possible overlap at the longer wavelength limit of the UV spectrum:

- **ultraviolet radiation**
UV 1 nm to 380 nm or 400 nm;
- **visible radiation**
VIS 380 nm to 780 nm;
- **infrared radiation**
IR 780 nm to 1 mm

3.1.2 ultraviolet radiation UV radiation

radiation for which the wavelengths are shorter than those for visible radiation

NOTE 1 The range between 100 nm and 400 nm is commonly subdivided into:

- UV-A 315 nm to 400 nm;
- UV-B 280 nm to 315 nm;
- UV-C 100 nm to 280 nm.

[CIE DS 017.1:2009]

NOTE 2 A precise border between "ultraviolet" and "visible" cannot be defined, because visual sensation at wavelengths shorter than 400 nm is noted for very high energy sources.

NOTE 3 For sunglasses for general use, the upper limit of UV-A is taken as 380 nm.

NOTE 4 This limit of 380 nm coincides with that taken in ophthalmic optics and in ISO 20473. Many of the medical, health and safety guidelines and standards that require taking UV radiation hazard exposure into consideration regard UV-A as extending up to 400 nm, as in NOTE 1.

NOTE 5 The UV-C range is defined as:

- Far UV (FUV)
190 nm to 280 nm;
- Vacuum UV (VUV)
100 nm to 190 nm (see ISO 20473).

NOTE 6 For eye protection, only the longer wavelength part of the UV-C range from 190 nm to 280 nm is of importance. This range is not contained in solar radiation and occurs from only a few artificial radiation sources.

NOTE 7 Ultraviolet radiation is sometimes considered to extend down to wavelengths of 1 nm (see ISO 20473). The zone, 1 nm to 100 nm, termed extreme UV, exists in vacuum only and is not applicable to eye and face protection.

3.1.3 visible radiation light

any optical radiation (3.1.1) capable of causing a visual sensation directly

NOTE 1 There are no precise limits for the spectral range of visible radiation since they depend upon the amount of **radiant power** reaching the retina and the responsiveness of the observer. The lower limit is generally taken between 360 nm and 400 nm and the upper limit between 760 nm and 830 nm.

[CIE DS 017.1:2009]

NOTE 2 The CIE gives a definition for light that is different, being based on perception. For purposes of eye and face PPE, light is regarded as synonymous with visible radiation.

NOTE 3 The wavelength range is taken to be between 380 nm and 780 nm.

3.1.4 infrared radiation IR radiation

optical radiation (3.1.1) for which the wavelengths are longer than those for visible radiation, from 700 nm to 1 mm

NOTE 1 For infrared radiation, the range between 780 nm and 1 mm is commonly subdivided into:

- IR-A 780 nm to 1 400 nm;
- IR-B 1 400 nm to 3 000 nm;
- IR-C 3 000 nm to 1 mm.

[CIE DS 017.1:2009]

NOTE 2 A precise border between "visible" and "infrared" cannot be defined because visual sensation at wavelengths greater than 780 nm is noted for very high energy sources at longer wavelengths.

3.1.5 monochromatic radiation monochromatic light

radiation characterized by a single frequency

[CIE DS 017.1:2009]

NOTE 1 Although frequency is the more fundamental property, the wavelength in air (or in vacuum) is more commonly used to characterize a monochromatic radiation.

NOTE 2 **Optical radiation** extending over a very narrow range of wavelengths (e.g. such as that emitted by a laser) that can be characterized by a single wavelength value (usually the mean) is regarded as monochromatic.

3.1.6 illuminant

radiation with a relative spectral power distribution defined over the wavelength range that influences object colour perception

[CIE DS 017.1:2009]

NOTE In everyday English, this term is not restricted to this sense; it is also used for any kind of light falling on a body or scene.

3.1.7

CIE standard illuminants

illuminants A and D65, defined by the CIE in terms of relative spectral power distributions

[CIE DS 017.1:2009]

NOTE 1 These illuminants are intended to represent:

A: Planckian radiation with a temperature of 2 856 K

D65: A daylight illuminant or phase of daylight with a correlated colour temperature of approximately 6 500 K (also called "nominal correlated colour temperature of the daylight illuminant", i.e. "approximate" and "nominal" are used).

NOTE 2 Illuminants B, C and other D illuminants, previously denoted as standard illuminants, should now be termed CIE illuminants.

NOTE 3 Tables defining some of these illuminants can be viewed at http://www.cie.co.at/index_ie.html.

3.2 Terms relating to sources of non-ionising radiation

3.2.1

air-arc cutting arc gouging

thermal gouging or cutting method for metallic materials, that uses an electric arc

NOTE This method uses a carbon electrode that forms a groove by melting or burning, while an air jet attached to the electrode removes the molten material. This groove can be deepened using the same thermal method to form a cut.

3.2.2

arc welding

electric welding method, which uses an arc that is generated between the rod-shaped metal electrode and the workpiece

NOTE The electrode melting in the hot arc is used as the filler metal for the welded joint.

3.2.3

short-circuit electric arc

intensive arc that can occur through switching or a short-circuit in electricity distribution installations

3.2.4

gas cutting flame cutting

thermal method of cutting metallic material using gas and oxygen

NOTE This method does not use an electric arc.

3.2.5

plasma arc cutting

thermal cutting method for metallic materials, that uses a constricted electric arc and a high-velocity jet of gas issuing from a constricting orifice to give a high-temperature plasma flame that melts and removes the metallic material

3.2.6

blacklight lamp ultraviolet radiation source

UV-A radiation source, generally a mercury vapour discharge lamp, with the bulb (high-pressure radiation source) or tube (low-pressure radiation source) made from light-absorbing, but UV-A-transmitting, filter glass

NOTE The glass filter appears almost black in colour.

3.2.7

halogen metal vapour lamp

mercury vapour lamp doped generally with a mixture of iodides of certain metals

3.2.8

low-pressure (intensity) mercury vapour lamp

mercury discharge lamp with or without a fluorescent layer, but with relatively large tube dimensions (fluorescent lamp) and an internal pressure between 300 Pa and 500 Pa

NOTE In mercury discharge lamps with a fluorescent layer, the layer is excited by the **ultraviolet radiation** of the discharge to generate **visible radiation**.

3.2.9

medium-pressure (intensity) mercury vapour lamp

mercury discharge lamp with an operating pressure of approximately 20 kPa

NOTE These discharge lamps are usually specified within the range of high-intensity lamps. Therefore, the term might become obsolete.

3.2.10 high-pressure (intensity) mercury vapour lamp

gas discharge lamp with an operating pressure in the discharge tube of approximately 200 kPa to 1 500 kPa

3.2.11 very-high-pressure (intensity) mercury vapour lamp

gas discharge lamp with an operating pressure in the discharge tube exceeding 10^4 kPa

NOTE To achieve this, it is necessary to reduce the arc length.

3.2.12 pulse duration full duration at half maximum FDHM

interval, in seconds, between the time in the time/power curve at which the power has risen to half the peak power and the time at which it has fallen to half the peak power

3.2.13 laser beam

optical radiation (3.1.1) from lasers that is generally focused, directed, monochromatic and coherent (correlated in space and time)

3.2.14 continuous-wave laser

laser that is capable of emitting its radiant energy continuously or with a minimum duration of 0,25 s

[IEC 60825-1:2007]

NOTE The hazard for a pulsed laser regarded as a continuous-wave laser, e.g. one with pulses longer than 0,25 s, should take into account the pulse duration.

3.2.15 helium-neon laser He-Ne laser

gas laser (helium-neon), the most common version of which produces red light of wavelength 632,8 nm

3.2.16 pulsed laser

laser which, on the basis of its construction, delivers its energy in single pulses, each of duration $>1 \mu\text{s}$

3.2.17 giant pulsed laser

laser which, on the basis of its construction, delivers its energy in single pulses, each of duration between 1 ns and 1 μs

3.2.18 mode-coupled laser mode-locked laser

laser that utilises a mechanism within the laser resonator to produce a train of very short (typically shorter than a nanosecond, e.g. picosecond or femtosecond) pulses

NOTE 1 While this is a deliberate feature of the laser, it can also occur spontaneously and is then called "self-mode-locking".

NOTE 2 Adapted from IEC 60825-1: 2007.

3.2.19 intense pulsed light source IPL

compact xenon arc lamp, operated in a pulsed mode, usually filtered to emit visible and near-infrared radiation

NOTE Although lasers can provide an intense pulsed source of light, when used in the medical or paramedical field, the term is restricted to xenon arc lamps. These have a broad spectral emission. The radiation emitted can be filtered to restrict the emission to the UV, visible or near-IR regions of the electromagnetic radiation spectrum.

4 Photometric terms

4.1 illuminance

E_v ; E
 (at a point on a surface) quotient of the **luminous flux** (4.4), $d\Phi_v$, incident on an element of the surface containing the point, by the area, dA , of that element

NOTE 1 Equivalent definition: integral, taken over the hemisphere visible from the given point, of the expression $L_v \cos \theta \, d\Omega$, where L_v is the **luminance** at the given point in the various directions of the incident elementary beams of **solid angle** $d\Omega$, and θ is the angle between any of these beams and the normal to the surface at the given point.

$$E_v = \frac{d\Phi_v}{dA} = \int_0^{2\pi\pi} L_v \cdot \cos \theta \cdot d\Omega$$

NOTE 2 Illuminance is expressed in lux ($\text{lx} = \text{lm}/\text{m}^2$).

NOTE 3 Adapted from CIE DS 017.1:2009.

NOTE 4 See also radiation **power**, **irradiance**.

4.2 irradiance

E_e ; E
 (at a point on a surface) quotient of the **radiant flux** (4.7), $d\Phi_e$, incident on an element of the surface containing the point, by the area, dA , of that element

NOTE 1 Equivalent definition: integral, taken over the hemisphere visible from the given point, of the expression $L_e \cos \theta \, d\Omega$, where L_e is the radiance at the given point in the various directions of the incident elementary beams of **solid angle** $d\Omega$, and θ is the angle between any of these beams and the normal to the surface at the given point.

$$E_e = \frac{d\Phi_e}{dA} = \int_0^{2\pi\pi} L_e \cdot \cos \theta \cdot d\Omega$$

NOTE 2 Irradiance is expressed in W/m^2 .

NOTE 3 Adapted from CIE DS 017.1:2009.

NOTE 4 See also illuminance and power density.

4.3 luminance

L_v ; L
 (in a given direction, at a given point on a real or imaginary surface) quantity defined by the formula:

$$L_v = \frac{d\Phi_v}{dA \cdot \cos \theta \cdot d\Omega}$$

where

$d\Phi_v$ is the **luminous flux** transmitted by an elementary beam passing through the given point and propagated in the **solid angle** $d\Omega$ containing the given direction;

dA is the area of a section of that beam containing the given point;

θ is the angle between the normal to that section and the direction of the beam

NOTE 1 Luminance is expressed in $\text{cd}/\text{m}^2 = \text{lm} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$.

[CIE DS 017.1:2009]

NOTE 2 Simplified to the standard case, **luminance** is the quotient of the luminous intensity, I , divided by the surface area projected perpendicular to the direction of radiation as a projected plane ($A \cos \theta$):

$$L = I / (A \cdot \cos \theta)$$

4.4 luminous flux

Φ_v , Φ
 quantity derived from the **radiant flux**, Φ_e , by evaluating the radiation in accordance with its action upon the CIE standard photometric observer

[CIE DS 017.1:2009]

NOTE 1 For photopic vision:

$$\Phi_v = K_m \int_0^\infty \frac{d\Phi_e(\lambda)}{d\lambda} \cdot V(\lambda) \cdot d\lambda$$

where

$\frac{d\Phi_e(\lambda)}{d\lambda}$ is the spectral distribution of the **radiant flux** and $V(\lambda)$ is the **spectral luminous efficiency**.

NOTE 2 Luminous flux is expressed in lumen (lm).

NOTE 3 Unless otherwise stated, photopic (daylight) vision is assumed.

NOTE 4 CIE DS 017.1:2009 (luminous efficacy of radiation) gives the values of K_m (photopic vision) as $683 \text{ lm} \cdot \text{W}^{-1}$ for $\nu_m = 540 \times 10^{12} \text{ Hz}$ ($\lambda_m \approx 555 \text{ nm}$) and K'_m (scotopic vision) as $1700 \text{ lm} \cdot \text{W}^{-1}$ for $\lambda'_m = 507 \text{ nm}$.

4.5 luminance coefficient

(at a surface element on the surface of the medium, in a given direction, under specified conditions of illumination) quotient of the **luminance** (4.3) of the surface element in the given direction divided by the **illuminance** (4.1) on the medium

$$q = \frac{L}{E}$$

where

L is the luminance in cd/m^2 ;

E is the illuminance in lx

[CIE DS 017.1:2009]

NOTE 1 The luminance coefficient is expressed in $(\text{cd}/\text{m}^2)/\text{lx} = \text{sr}^{-1}$.

NOTE 2 This is a measure of the **light** scattered by an **ocular**, the **luminance** of the **light** scattered by the **ocular** being expressed as a proportion of the amount of **light** falling on the **ocular**. See 9.1.11 to 9.1.14.

4.6 reduced luminance coefficient

luminance coefficient (4.5), l^* , corrected for the **transmittance** (9.1.13) of a **filter** (9.1.1) or **ocular** (5.1.3)

NOTE 1 This is obtained by dividing the **luminance coefficient**, l , by the **luminous transmittance** (9.1.15), τ_v , of the **filter**, i.e. by the equation:

$$l^* = l / \tau_v$$

NOTE 2 Reduced luminance coefficient is expressed in $(\text{cd}/\text{m}^2)/\text{lx}$.

4.7 radiant flux radiant power

power emitted, transmitted or received in the form of radiation

NOTE Radiant flux is expressed in watts (W).

[CIE DS 017.1:2009]

4.8 radiant exposure

H_e ; H
quotient of the radiant energy, dQ_e , incident on an element of the surface containing the point over the given duration, by the area, dA , of that element

NOTE 1 This is measured at a point on a surface over a given duration.

NOTE 2 Equivalent definition: time integral of the **irradiance**, E_e , at the given point, over the given duration, Δt

$$H_e = \frac{dQ_e}{dA} = \int_{\Delta t} E_e \cdot dt$$

NOTE 3 Radiant exposure is expressed in J/m^2 or $\text{W} \cdot \text{s}/\text{m}^2$.

NOTE 4 Adapted from CIE DS 017.1:2009.

4.9 power density

power of the radiation that is transmitted relative to the cross-sectional area of the beam

NOTE 1 Power density is expressed in W/m^2 .

NOTE 2 See also **radiation power**, E .

4.10 radiation power

E
<qualitative> energy, in the form of electromagnetic radiation, per unit time

4.11 spectral luminous efficiency for photopic vision

$V(\lambda)$
<for a monochromatic radiation of wavelength, λ > ratio of the **radiant flux** (4.7) at wavelength λ_m to that at wavelength λ , such that both radiations produce equally intense luminous sensations under specified photometric conditions and λ_m is chosen so that the maximum value of the ratio is equal to 1

NOTE 1 Unless otherwise indicated, the values used for the spectral

luminous efficiency in photopic vision are the values agreed internationally in 1924 by the CIE (Compte Rendu 6^e session, p. 67), completed by interpolation and extrapolation (CIE Publications No. 18 (1970), p. 43; and ISO 23539:2005/CIE S 010:2004), and recommended by the International Committee of Weights and Measures (CIPM) in 1972.

For scotopic vision, $V'(\lambda)$, the CIE adopted in 1951, for young observers, the values published in Compte Rendu 12^e session, Vol. 3, p. 37, and in ISO 23539:2005/CIE S 010:2004, and ratified by the CIPM in 1976.

These values define respectively the $V(\lambda)$ and $V'(\lambda)$ functions for photopic and scotopic vision.

NOTE 2 The CIE, considering the discrepancies between the average human spectral luminous efficiency and the $V(\lambda)$ function, adopted in 1990 (see CIE 86:1990) the "CIE 1988 modified 2° spectral luminous efficiency function for photopic vision", $V_M(\lambda)$, and recommended it for applications in visual sciences.

NOTE 3 The CIE, considering that the spectral luminous efficiency function of the human eye changes with visual angle, adopted in 2005 (see CIE 165:2005) the "CIE 10° photopic photometric observer", $V_{10}(\lambda)$, to be used if the visual target has an angular subtense larger than 4° or is seen off axis. Photometric quantities are calculated using the $V_{10}(\lambda)$ function in the following way:

$$\Phi_{v,10} = K_{m,10} \int_0^\infty \Phi_e(\lambda) \cdot V_{10}(\lambda) \cdot d\lambda$$

where

$$K_{m,10} = 683,599 \text{ lm} \cdot \text{W}^{-1} \\ \approx 683,6 \text{ lm} \cdot \text{W}^{-1}$$

NOTE 4 Adapted from CIE DS 017.1:2009.

4.12 candela

unit of luminous intensity of a source

NOTE 1 Unit: cd = lm/sr.

NOTE 2 The SI unit of luminous intensity, the candela, is the luminous intensity, in a given direction, of a source that emits **monochromatic radiation** of frequency 540×10^{12} Hz and that has a radiant intensity in that direction of $1/683$ W/sr (16th General Conference of Weights and Measures, 1979).

[CIE DS 017.1:2009]

4.13 solid angle

three-dimensional angle, e.g. the cone of light from a pocket lamp

NOTE 1 If an imaginary sphere is constructed with its centre at the apex of the angle, the value, Ω , of the **solid angle** is given by the area, A , enclosed by the angle on the surface of the sphere divided by the square of the sphere's radius, r .

NOTE 2 Solid angles are expressed in steradians (sr).

See Figure 1.

5 Terms relating to eye and face protection

5.1 General terms

5.1.1 eye-protector

any form of eye protective equipment intended to protect not less than the region of the eye

5.1.2 intended use

use of a product, process or service in accordance with information provided by the supplier

[ISO/IEC Guide 51:1999]

NOTE See also reasonably foreseeable misuse (2.5).

5.1.3 ocular

generic term for the light-transmitting part of an **eye protector** (5.1.1) (made of mesh, glass or plastic material) permitting vision

EXAMPLES Lens, visor, screen.

5.1.4 protective ocular

ocular with a defined mechanical protective effect higher than **minimum robustness** (5.1.22)

NOTE It can have a filtering effect.

5.1.5 untinted ocular

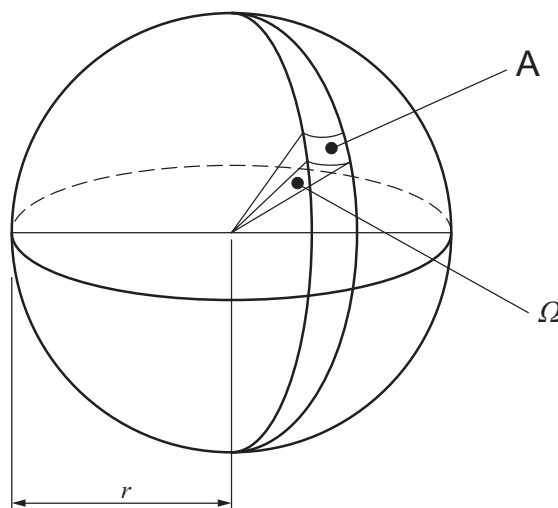
ocular with no noticeable colour in transmission

5.1.6 eye-guard eye-shield

device which provides protection to the eye region

5.1.7 face-guard

device which provides protection to the eyes and a substantial area of the **face** (8.2.1)



Key

Ω	the solid angle, in steradians ($\Omega = A/r^2$)
A	area of surface on the imaginary sphere
r	radius of the imaginary sphere

Légende

Ω	angle solide, en stéradians ($\Omega = A/r^2$)
A	aire de la surface de la sphère fictive
r	rayon de la sphère fictive

Legende

Ω	Raumwinkel
A	Fläche auf der imaginären Oberfläche
r	Radius der imaginären Kugel

Figure 1 — Diagram representing the derivation of the steradian

5.1.8 face-screen face-shield

eye-protector (5.1.1) covering the eyes and all, or a substantial part, of the **face** (8.2.1), which can be mounted directly on the head using a support and/or **harness** (5.3.3), or mounted on a protective or non-protective helmet

NOTE 1 The terms **face-screen** and **face-shield** are commonly used interchangeably to mean either the whole assembly (including support, harness, frames or carriers) or only the **ocular** and its surround, if any²⁾, that provides the protection to the eyes and face.

NOTE 2 See also **visor** (5.1.14).

NOTE 3 Coverage can include parts or all of the scalp, the ears, the throat and the neck.

NOTE 4 The **areas to be protected** are defined in the relevant standard, and should not automatically be assumed to be the same as the areas covered.

5.1.9 goggle

eye-protector that tightly encloses the orbital area and sits on the **face** (8.2.1)

2) "**Ocular** and its surround, if any" includes both those face-shields having a single piece of transparent plastic material to form the ocular and face protection, and others, e.g. for welding, that have a true **ocular** mounted within an opaque shield to protect the rest of the face.

5.1.10 hand-shield

eye-protector (5.1.1) (with or without **filtering action**) intended to be held in the hand to give protection to the eyes and all or part of the **face** (8.2.1)

5.1.11 helmet

headgear made of shock-resistant material intended to protect parts of the wearer's head against a specified hazard, or hazards

5.1.12 protective mask

eye-protector (5.1.1), which can be worn either directly on the head (with a support) or mounted on a protective (or non-protective) **helmet** (5.1.11), that protects the eyes and all, or a substantial part, of the **face** (8.2.1)

NOTE Protection can also include parts or all of the scalp, the ears, the throat and the neck.

5.1.13 spectacles

eye-protector (5.1.1) in a spectacle configuration

NOTE 1 The front, including the bridge resting on the nose and **oculars**, might be moulded in one piece, or alternatively have an aperture into which separate **oculars** have been inserted/mounted.

NOTE 2 The sides may be continued behind the head with a **headband**.

NOTE 3 A spectacle eye-protector might have lateral protection.

5.1.14 visor

eye-protector (5.1.1) covering either the eye area or both the eye area and all or parts of the **face** (8.2.1)

NOTE 1 This term has variable common usage:

- it is sometimes used to mean the same as **face-screen** or **face-shield** (5.1.8);
- it is sometimes used to mean only the **ocular** and its surround, if any³⁾, part of a face screen/shield that provides the protection to the eyes and face (the deprecated term "window" is sometimes also used for this);
- it is sometimes used to mean the **ocular** and its surround, if any, that is mounted on a protective or non-protective helmet; and
- it is sometimes used to mean the **ocular** and its surround, if any, in a full face tight- or loose-fitting respiratory protective device.

NOTE 2 The **areas to be protected** are defined in the relevant standard and should not automatically be assumed to be the same as the areas covered.

3) "**Ocular** and its surround, if any" includes both those face-shields having a single piece of transparent plastic material to form the ocular and face protection, and others, e.g. for welding, that have a true **ocular** mounted within an opaque shield to protect the rest of the face.

5.1.15 clip-on

pair of filters or a one-piece filter designed to clip on over the front of or behind a pair of **spectacles** (5.1.13)

5.1.16 prescription insert

device for carrying prescribed lenses that is intended to be attached on the inside of the **eye-protector** (5.1.1), between the eyes of the wearer and the protective ocular

5.1.17 mesh

lattice of protective material enclosing open areas

NOTE A metal mesh may be woven or perforated; a plastic mesh may be moulded, woven or perforated.

5.1.18 blink reflex

property of the human eye to close the eyelid within 0,25 s when stimulated by intense light or other stimuli

5.1.19 photophobia

uncomfortable sensation in the eye when subjected to light

NOTE 1 Photophobia can occur with any anterior eye ailment, e.g. conjunctivitis, iritis or keratitis.

NOTE 2 The word "photophobia" literally means "fear of light".

5.1.20 areas to be protected

those zones of the appropriate headform (size, facial characteristics) specified by the appropriate product standard

5.1.21 areas to be tested

those zones of the **eye-** (5.1.1) and **face** (8.2.1) protector to be tested in accordance with the appropriate product standard

NOTE Areas may be subdivided into those requiring optical testing and those requiring non-optical testing, e.g. a faceguard might have an area 120 mm wide by 50 mm deep requiring optical testing and a much larger zone, including the **ocular**, requiring testing against non-optical **hazards**.

5.1.22 minimum robustness mechanical strength

(5.1.24) of an **ocular** to resist fracture or deformation by a (quasi-static) force on its surface

5.1.23 static deformation

bending or deformation of an ocular or protective lens through the action of a (quasi-static) force on its surface

NOTE This is the deformation produced during the minimum robustness test.

5.1.24 mechanical strength

numerical indicator of the protective ability against mechanical hazards, greater than minimum robustness, of an ocular or eye-protector to resist fracture or deformation by impact

NOTE 1 Strengths 1 and 2 are tested by drop ball, 3 to 5 by ballistic methods.

NOTE 2 For special cases, such as a squash ball impact test, a different classification symbol is used.

NOTE 3 To avoid confusion with optical quality, the number might have to be prefaced by a letter.

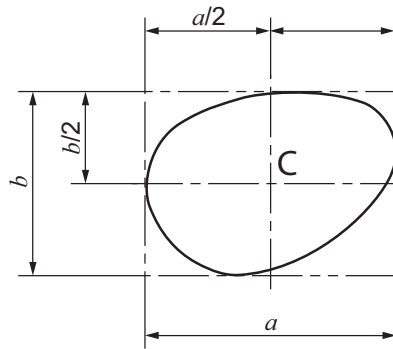
5.2 Terms relating to the geometrical properties of eye and face protection

5.2.1 boxed centre

intersection of the horizontal and vertical centrelines of the rectangular box which circumscribes the ocular shape

NOTE Adapted from ISO 8624:2011.

See Figure 2.

**Key**

- a horizontal boxed ocular size
 b vertical boxed ocular size
 C boxed centre

Légende

- a dimension horizontale de la boîte de l'oculaire
 b dimension verticale de la boîte de l'oculaire
 C centre de la boîte

Legende

- a Sichtscheibenlänge
 b Sichtscheibenhöhe
 C geometrischer Scheibenmittelpunkt

Figure 2 — Boxed centre

5.2.2 geometric centre

point of intersection of the diagonals of the smallest rectangle with horizontal and vertical sides that can be drawn around the uncut ocular

5.2.3 face form angle

angle between the plane of the **eye-protector** (5.1.1) front and the plane of the right ocular shape, or of the plane of the left ocular shape

NOTE 1 The plane of the **eye-protector** front is the plane containing the vertical centrelines of the right and left boxed ocular shapes, and the plane of the ocular shape is the plane tangential to the front surface of a plano **ocular** at its **boxed** centre, when mounted in the frame.

NOTE 2 The right or left face form angle is regarded as positive if the temporal side of the right or left **ocular** is closer to the head than the plane of the **eye-protector** front.

NOTE 3 The face form angles are often measured and specified as the average of the right (α_R) and left (α_L) angles, but the frame can be adjusted so that they differ for a specific wearer; the angles should then be specified as α_R and α_L .

NOTE 4 Adapted from ISO 8624:2011.

See Figure 3.

5.2.4 “as-worn” pantoscopic angle

angle in the vertical plane between the normal to the front surface of the ocular at its boxed centre and the line of sight of the eye when looking straight ahead, usually taken to be the horizontal

NOTE 1 The angle is regarded as positive if the lower part of the ocular lies closer to the face.

NOTE 2 Adapted from ISO 13666:—.

5.2.5 ocular area

that part of an **eye-protector** (5.1.1), other than the **frame** (5.3.2), which permits vision

NOTE This commonly applies to mesh-type **eye-protectors**.

5.2.6 field of view

extent of vision through the mounted ocular in the “as-worn” position measured with reference to the entrance pupil of the stationary eye when placed on the appropriate headform

NOTE 1 This might be larger than any minimum field of view required in the relevant product or requirement standard.

NOTE 2 The field may be expressed in angular or linear measure, depending upon the product standard.

5.2.7 area of critical optical quality

that zone (or zones for a one-piece ocular intended to protect both eyes) of the ocular in which the optical properties of the ocular are tested

NOTE The fields can be expressed in angular or linear measure depending upon the product standard.

5.2.8 field of peripheral awareness

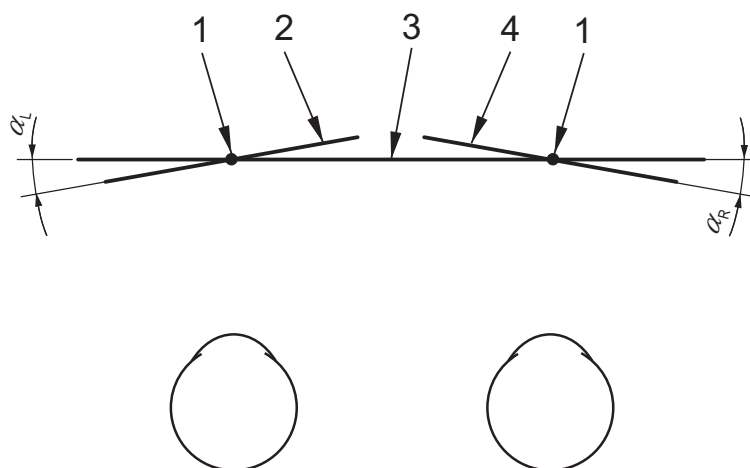
that portion of the **field of view** (5.2.6) that lies outside the **area of critical optical quality** (5.2.7)

NOTE The fields may be expressed in angular or linear measure, depending upon the product standard.

5.3 Terms relating to the non-ocular part of eye and face protection

5.3.1 comfort band sweat band

accessory to cover at least the forehead zone of the inner surface of the **headband** (5.3.4) to improve wearer comfort

**Key**

- 1 point of intersection of plane of the **eye-protector** front with vertical centreline of the ocular shape
- 2 plane of left **ocular** shape
- 3 plane of **eye-protector** front
- 4 plane of right **ocular** shape
- α_R right face form angle
- α_L left face form angle

Légende

- 1 point d'intersection du plan de la face avant du protecteur de l'œil avec l'axe vertical de la forme de l'oculaire
- 2 plan de la forme de l'oculaire gauche
- 3 plan de la face avant du protecteur d'œil
- 4 plan de la forme de l'oculaire droit
- α_L angle de forme de face gauche
- α_R angle de forme de face droite

Legende

- 1 Schnittpunkt der vertikalen Mittellinie der Sichtscheibe mit der Fassungsebene der Sichtscheibe
- 2 linke Sichtscheibenebene
- 3 Fassungsebene
- 4 rechte Sichtscheibenebene
- α_R rechter Fassungsscheibenwinkel
- α_L linker Fassungsscheibenwinkel

Figure 3 — Face form angle (schematic representation of the plane of the eye-protector front and the ocular shapes, as seen from above)

5.3.2 frame

that part of the **eye-protector** (5.1.1) or spectacle on which the oculars are mounted

NOTE Components of the **frame** (to support the **oculars** on **eye-protectors** excluding those of spectacle type) can be the holders, supports, connecting elements and extension pieces.

5.3.3 harness

assembly that provides a means of maintaining a **face-shield** (5.1.8) in its intended position on the head

5.3.4 headband

(goggle and spectacles) that part of the **eye-protector** (5.1.1) that is fitted around a head to hold the eye-protector in its intended position

5.3.5 headband

(harness) that part of the **face-shield** (5.1.8) **harness** (5.3.3) that surrounds the head

5.3.6 housing

that part of the protector that supports the ocular or ocular assembly

NOTE An ocular assembly is where the eye is protected by more than a single **ocular**, e.g. **welding filter** provided with either a **cover plate** and/or **backing ocular**.

5.3.7 browguard
face-shield (5.1.8) or **eye-shield**
ocular holder designed to protect the forehead region, often secured by a head **harness**

5.3.8 lateral protection
that part of an **eye-protector** (5.1.1) which is intended to protect the eye against hazards from the side

5.3.9 side shield
that part of a spectacle **frame** (5.3.2) providing **lateral protection** (5.3.8)

5.4 Terms relating to welding protection⁴⁾

5.4.1 welding protector
device which provides protection to the wearer against harmful optical radiation and other specific **risks** (2.4) generated by welding or allied processes

NOTE This might be a welding shield, a welding **goggle** or welding **spectacles**.

5.4.2 welding goggle
welding protector, usually held in position by a **headband** (5.3.4), enclosing the orbit, into which radiation arising from the welding operation can penetrate only through the **filter(s)** (9.1.1) and, if provided, **cover plate(s)** (5.5.2)

⁴⁾ Terms relating to the filtering properties of welding oculars are given in 9.3.

5.4.3

welding face-shield

face-shield with **filtering action** suitable for welding protection

5.4.4

welding hand-shield

hand-shield with **filtering action** suitable for welding protection

5.4.5

welding spectacles

spectacle (5.1.13) frame, with **lateral protection** (5.3.8), holding suitable **filters** (9.1.1) in front of the eyes to give them protection

NOTE It can usually be held in position with side-arms or with an additional **headband** fitting.

5.4.6

protective helmet-mounted welding face-shield

welding face-shield (5.4.3), mounted on a compatible protective helmet

5.4.7

welding helmet

welding face-shield (5.4.3), mounted on or integrated into protective or non-protective headgear

NOTE This might also incorporate respiratory protection.

5.5 Terms relating to secondary oculars

5.5.1

backing ocular

backing plate (deprecated)

ocular (5.1.3) placed behind a **welding filter** [i.e. between the **welding filter** (9.3.1) and the wearer's **face** (8.2.1)] and used mainly to protect the wearer from flying particles or to protect the back surface of the **welding filter** from scratches

5.5.2

cover plate

ocular (5.1.3) generally placed in front of a **welding filter** (i.e. between the **welding filter** and the workpiece) and used mainly to protect the **welding filter** from hot particles, splashes of hot liquid or molten metal and scratches

NOTE 1 Cover plates are generally only used in hand screens, face screens and protective masks.

NOTE 2 The term "**cover plate**" is sometimes also used to mean a **backing ocular** where it is intended to protect the **filter** from scratches.

5.5.3

protective plate safety plate

generally untinted **ocular** (5.1.3) that can be placed either in front of or behind the **welding filter** (9.3.1) to protect the wearer and/or the **welding filter** from harm and/or damage caused by, for example, flying particles, hot particles and splashes of molten metal.

NOTE 1 It can also protect the **welding filter** from scratches.

NOTE 2 These oculars may be placed either between the welding filter and the workpiece or between the welding filter and the face, depending on their exact intended purpose. It is not necessarily only the ocular behind the welding filter that protects the wearer from flying particles. For example, many automatic welding filters have a clear ocular placed in front of the welding filter with the function of being the main impact protection.

NOTE 3 In practice, these and the terms "**cover plate**", "safety ocular" or "protection plate" are often treated as having the same general meaning.

6 Terms relating to optical materials

6.1

absorptance

α

ratio of the absorbed **radiant** (4.7) or **luminous flux** (4.4) to the incident flux under specified conditions

NOTE 1 Practically, **absorptance** equals 1 minus the sum of **transmittance** and **reflectance**.

NOTE 2 Some manufacturers use the term **absorption** and specify the value of the **absorption** as the difference 1 minus the **luminous transmittance**.

[CIE DS 017.1:2009]

6.2

absorption

process by which radiant energy is converted to a different form of energy by interaction with matter

[CIE DS 017.1:2009]

NOTE See also 7.1, Note 2.

6.3

reflection

process by which radiation is returned by a surface or medium, without change of frequency of its monochromatic components

NOTE 1 Part of the radiation falling on a medium is reflected at the surface of the medium (surface reflection); another part can be scattered back from the interior of the medium (volume reflection).