SLOVENSKI STANDARD
oSIST prEN ISO 13666:2017

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Očesna optika - Stekla očal - Slovar (ISO/DIS 13666:2017)

Ophthalmic optics - Spectacle lenses - Vocabulary (ISO/DIS 13666:2017)

Augenoptik - Brillengläser - Vokabular (ISO/DIS 13666:2017)

Optique ophtalmique - Verres de lunettes - Vocabulaire (ISO/DIS 13666:2017)

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Ophthalmic optics — Spectacle lenses — Vocabulary

Optique ophtalmique — Verres de lunettes — Vocabulaire

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Foreword

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

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

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

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

The committee responsible for this document is ISO/TC 172 *Optics and photonics*, Subcommittee 7, *Ophthalmic optics and instruments.*

This third edition cancels and replaces the second edition (2012), which has been technically revised.

Introduction

This revision has been renumbered in line with ISO recommendations. "Notes" have been replaced by "notes to entry" – these are normative, as opposed to notes in specification standards which are informative.

This revision has resulted in a few terms that were no longer used in spectacle lens standards or in communications between participants in the spectacle lens manufacturing and dispensing chain being deleted. The terms that were in Section 17 have been ether moved or incorporated into earlier sections.

Around 40 % of terms and definitions have been revised. In some cases, this is as little as changing the order of synonyms for the term, to significant changes in the wording of definitions or notes to entry, but without change of meaning.

The meaning of vertex distance has been altered so that it now refers to the horizontal distance between the back surface of the lens and the apex of the cornea, measured with the eyes in the primary position. The design reference points are where the manufacturer's specifications apply, while the reference points are where the lenses are to be verified. For single-vision and most multifocal lenses, these are the same. The previous distinction for a multifocal lens, where the distance design reference point was usually the centre of the semi-finished lens blank (now called simply "blank") while the distance reference point was usually the intended position of the optical centre of the distance portion after surfacing has been removed – they are the design reference point or simply the reference points of the blank and the finished lens.

The term "*as-worn" corrected dioptric power* has been replaced by the term *verification power* – this word explains its purpose better, and is clarified by a new definition. Shape magnification has been replaced by the more general *spectacle magnification.*

The following additional terms have been added:

as-worn pantoscopic angle	power-variation blank
centration point position	power-variation lens*
darkened state	power-variation surface
degressive-power blank	presbyopia
distance power	prescribed power
faded state	primary reference point*
fused multifocal lens	reference point
infrared transmittance	secondary reference point*
lens shape	segment bottom
mean sphere	segment top
near power	solar blue-light transmittance
near reference point	spectacle magnification
ordered distance prismatic effect	spherical equivalent power
ordered near prismatic effect	traffic signal light
ordered power	ultraviolet transmittance
ordered prismatic effect	variation power*
position-specific single-vision lens*	verification power*

*These terms have been copied from ISO/DIS 21987, from which they will be deleted in its next edition.

Ophthalmic optics — Spectacle lenses — Vocabulary

1 Scope

This International Standard defines basic terms relating to ophthalmic optics, specifically to semi-finished spectacle lens blanks, finished spectacle lenses and fitting purposes.

Terms relating to processes and material for fabrication and surface treatment (other than some specific terms relating to coatings, which are defined in Clause 16) and terms relating to defects in materials and after optical processing are given in ISO 9802.

2 Normative references

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

ISO 8429, *Optics and optical instruments — Ophthalmology — Graduated dial scale*

3 Terms and definitions

General considerations in the interpretation of this vocabulary document are:

— The unit of focusing power, expressed in reciprocal metres (m^{-1}), of a lens or surface is the dioptre. See 9.1 for a complete definition

— The unit of prismatic power is the prism dioptre (Δ), expressed in centimetres per metre (cm/m). See 10.11 for a complete definition.

— To simplify definitions and the understanding of the optics of ophthalmic lenses, aberrations of lenses and prisms are ignored in definitions except when specifically mentioned.

— Definitions are classified according to subject.

— Some obsolete terms are listed for convenience, but are indicated as deprecated and should not be used.

— In this standard, the word "normal" (to a surface) means a line that is at 90° to a plane that is tangential to a surface, i.e. is perpendicular to the surface.

For the purposes of this document, the following terms and definitions apply.

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

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

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

— CIE International Lighting Vocabulary CIE S 017/E: 2011: available at http://eilv.cie.co.at/

3.1 Terms and definitions relating to basic optics

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)

[SOURCE: CIE S 017/E:2011 17-848.]

3.1.2
visible radiation
light
any *optical radiation* capable of causing a visual sensation directly

[SOURCE: CIE S 017/E:2011 definition for visible radiation, 17.1402 amended by the deletion of the note.]

Note 1 to entry: The limits of photo-detection depend upon the amount of radiant power reaching the retina and the responsivity of the observer.

Note 2 to entry: ISO 20473 *Spectral Bands* specifies the spectral range of visible radiation to have a lower limit of 380 nm and an upper limit of 780 nm for application to Optics and Photonics standards. These limits apply to spectacle lens standards.

3.1.3
ultraviolet radiation
DEPRECATED: ultraviolet
optical radiation for which the wavelengths are shorter than those for *visible radiation*

[SOURCE: CIE S 017/E:2011, 17.1367, modified - By deletion of its notes.]

Note 1 to entry: ISO 20473 specifies the spectral range of ultraviolet radiation for the application to Optics and Photonics standards and subdivides the UV range into:

— UV-A: 315 nm to 380 nm;

— UV-B: 280 nm to 315 nm;

— UV-C: 100 nm to 280 nm.

These limits apply to spectacle lens standards.

3.1.4
infrared radiation
DEPRECATED: infrared
optical radiation for which the wavelengths are longer than those for *visible radiation*

Note 1 to entry: 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: 1,4 μm to 3 μm;

— IR-C: 3 μm to 1 mm.

[SOURCE: CIE S 017/E:2011, 17.580.]

Note 2 to entry: These limits are also specified in ISO 20473.

Note 3 to entry: The solar infrared spectrum at sea level extends to about 2 000 nm.

Note 4 to entry: The range of infrared emitted by the source and reaching the lens should be considered in the design of an infrared-absorbing material.

3.1.5
refractive index
$n(\lambda)$
ratio of the velocity of propagation of monochromatic radiation of the wavelength (λ) in vacuum to their velocity of propagation in the medium

Note 1 to entry: For technical applications, the refractive index is given against air instead of against vacuum.

Note 2 to entry: The wavelengths to be used for the characterization of optical glasses, all kinds of optical systems and instruments, and *spectacle lenses*, are specified in ISO 7944.

3.1.6
chromatic dispersion
change in the velocity of propagation and thereby in the refractive index of monochromatic radiation in a medium as a function of the frequency of the radiation

Note 1 to entry: The dispersion gives rise to chromatic aberration in a lens made from dispersive materials.

3.1.7
Abbe number
$\upsilon_{d,}\ \upsilon_{e,}$
DEPRECATED: constringence
DEPRECATED: V-value
indicator of the chromatic dispersion of an *optical material* or component

Note 1 to entry: The Abbe number may be calculated as either:

$$\upsilon_d = \frac{n_d - 1}{n_F - n_C}$$

where

n_d is the refractive index of the yellow helium d-line (wavelength: 587,56 nm);

n_F is the refractive index of the blue hydrogen F-line (wavelength: 486,13 nm); and

n_C is the refractive index of the red hydrogen C-line (wavelength: 656,27 nm);

or

$$\upsilon_e = \frac{n_e - 1}{n_{F'} - n_{C'}}$$

where

n_e is the refractive index of the green mercury e-line (wavelength: 546,07 nm);

$n_{F'}$ is the refractive index of the blue cadmium F′-line (wavelength: 479,99 nm); and

$n_{C'}$ is the refractive index of the red cadmium C′-line (wavelength: 643,85 nm).

Note 2 to entry: These reference wavelengths are given in ISO 7944:1998.

3.1.8
optical axis
straight line joining the centres of curvature of both surfaces of a lens

Note 1 to entry: This line is normal to both optical surfaces so light can pass along it undeviated.

Note 2 to entry: For lenses with strong prismatic power, the optical axis can lie outside the area of the lens.

Note 3 to entry: Power-variation lenses do not have a true optical axis.

3.1.9
vertex
point of intersection of the *optical axis* with a surface of a lens

3.1.10
power
capacity of a lens or optical surface to change the curvature or direction of incident wavefronts by refraction

3.1.11
focal point
image point conjugate to an infinitely distant object point on the *optical axis*

3.1.12
bioactinic
exhibiting or referring to *bioactinism*

3.1.13
bioactinism
property of *optical radiation* which enables it to cause chemical changes to biological tissues

3.1.14
presbyopia
reduction in the amplitude of accommodation through normal ageing, resulting in the inability to focus at usual near distances with any ametropia corrected

3.2 Basic terms and definitions relating to spectacle lenses and their dispensing

3.2.1
boxed lens system
boxing system
system of measurement and definitions based on the rectangle formed by the horizontal and vertical tangents to the extremities of the *lens shape*

[SOURCE: ISO 8624:2011, 3, amended by the addition of Note 1 to entry to enable this frame measurement system to deal with a lens before it is mounted.]

Note 1 to entry: Because the horizontal and vertical tangents may not be in the same plane, for a lens this may be thought of as an orthogonal projection onto a plane parallel to the front surface at its boxed centre.

3.2.2
lens shape
outline of the edged lens periphery in its intended orientation with the nasal side indicated

Note 1 to entry: *Lens shape* refers to the shape of spectacle lenses with:

— for a spectacle lens having a bevelled edge, the outermost edge of the spectacle lens, the lens having a bevel which includes a symmetrical angle of 120° and a bevel width greater than the width of the groove in the front;

— for a spectacle lens having a flat or grooved edge, the outermost edge of the spectacle lens.

[SOURCE: ISO 8624:2011, A.10, modified - By the addition of the word "edged", replacement of the words "and the horizontal" replaced by "in its intended orientation" and the deletion of the word "hypothetical" in Note 1 to entry.]

3.2.3
horizontal centreline
straight line located at an equal distance from the two horizontal tangents of the *boxed lens (boxing) system*

[SOURCE: ISO 8624:2011, A.1, modified - By the addition of the word "straight".]

3.2.4
vertical centreline
straight line located at an equal distance from the vertical sides of the rectangular box which circumscribes the lens shape

[SOURCE: ISO 8624:2011, A.2, modified - By the addition of the word "straight".]

3.2.5
boxed centre
intersection of the *horizontal centreline* and the *vertical centreline* of the rectangular box that circumscribes the lens shape

[SOURCE: ISO 8624:2011, 2.1, modified - By replacing the word "which" by "that".]

Note 1 to entry: This term is applied to spectacle frames and to the *edged lens*.

3.2.6
geometrical centre
geometric centre
intersection of the horizontal and *vertical centrelines* of the rectangular box that circumscribes the shape of the *blank* or *uncut lens*

3.2.7
nominal size
d_n
dimension indicated by the manufacturer

Note 1 to entry: For round lens blanks or lenses, the terms "nominal diameter", "effective diameter" and "usable diameter" are used.

Note 2 to entry: Where a lens blank or lens is not circular, the horizontal and vertical dimensions shall be given.

3.2.8
effective size
d_e
actual dimension

Note 1 to entry: For round lens blanks or lenses, the terms "nominal diameter", "effective diameter" and "usable diameter" are used.

Note 2 to entry: Where a lens blank or lens is not circular, the horizontal and vertical dimensions shall be given.

3.2.9
usable size
d_u
dimension of the area that is optically usable

Note 1 to entry: For round lens blanks or lenses, the terms "nominal diameter", "effective diameter" and "usable diameter" are used.

Note 2 to entry: Where a lens blank or lens is not circular, the horizontal and vertical dimensions shall be given.

3.2.10
horizontal axis
zero direction through a reference point on the lens for the specification of *cylinder axes* and prism *base settings* as defined in ISO 8429

3.2.11
meridian
⟨of a surface⟩ each plane which contains the centre(s) of curvature of a surface

Note 1 to entry: See also *principal meridians*.

3.2.12
meridian
⟨of a lens⟩ each plane which contains the *optical axis* of a lens

3.2.13
front surface
surface of the *spectacle lens* intended to be fitted away from the eye

3.2.14
back surface
surface of the *spectacle lens* intended to be fitted nearer to the eye

3.2.15
optical centre
intersection of the *optical axis* with the *front surface* of a lens

3.2.16
design reference point
point stipulated by the manufacturer, on the finished surface of a *blank* or on the *front surface* of the *finished lens*, at which the design specifications apply

EXAMPLES *Distance design reference point* and *near design reference point*.

3.2.17
reference point
point, stipulated by the manufacturer, on the *front surface* of a *finished lens* or on the finished surface of a *blank* at which the *verification power* of a specific portion applies

Note 1 to entry: Unless a verification power is stated, the power is the nominal or ordered power. See note 3 to entry to *verification power*.

Note 2 to entry: This point may, in some circumstances, differ from the respective *design reference point*.

Note 3 to entry: With some power-variation lenses, *focal power* is measured at some reference points, *prismatic power* at others.

EXAMPLES *Distance reference point* and *near reference point*.

3.2.18
distance design reference point
point, stipulated by the manufacturer, on the *front surface* of a *finished lens* or on the finished surface of a *blank*, at which the design specifications for the *distance portion* apply

3.2.19
near design reference point
point, stipulated by the manufacturer, on the *front surface* of a *finished lens* or on the finished surface of a *blank* at which the design specifications for the *near portion* apply

3.2.20
distance reference point
major reference point
point on the *front surface* of the lens at which the *verification* or *dioptric power* for the *distance portion* applies

Note 1 to entry: This point may, in some circumstances, be different from the *distance design reference point*.

3.2.21
near reference point
point on the *front surface* of the lens at which the *verification power* for the *near portion* applies

Note 1 to entry: This point may, in some circumstances, be different from the *near design reference point*.

3.2.22
primary reference point
point on the front surface of a *power-variation lens* at which the *verification power* for the designed primary use of the lens applies

Note 1 to entry: All *power-variation lenses* have a *primary reference point*.

Note 2 to entry: For example, the *primary reference point* for a *progressive-power lens* is the *distance reference point* and for a *degressive-power lens* is the near reference point.

[SOURCE: ISO/DIS 21987:2016.]