INTERNATIONAL STANDARD

ISO 8980-2

Third edition
2017-07

Ophthalmic optics — Uncut finished spectacle lenses —

Part 2: Specifications for power-variation lenses

Optique ophtalmique — Verres de lunettes finis non détourés —
Partie 2: Spécifications pour les verres à variation de puissance

Reference number
ISO 8980-2:2017(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

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

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

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

This document was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 7, *Ophthalmic optics and instruments*.

This third edition cancels and replaces the second edition (ISO 8980-2:2004), which has been technically revised. It also incorporates the Technical Corrigendum ISO 8980-2:2004/Cor.1:2006.

A list of all parts in the ISO 8980 series can be found on the ISO website.

Ophthalmic optics — Uncut finished spectacle lenses —

Part 2: Specifications for power-variation lenses

1 Scope

This document specifies requirements and verification methods for the optical and geometrical properties for uncut finished power-variation lenses.

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 7944, *Optics and optical instruments — Reference wavelengths*

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

ISO 8598-1, *Optics and optical instruments — Focimeters — Part 1: General purpose instruments*

ISO 8980-3, *Ophthalmic optics — Uncut finished spectacle lenses — Part 3: Transmittance specifications and test methods*

ISO 13666, *Ophthalmic optics — Spectacle lenses — Vocabulary*

ISO 14889, *Ophthalmic optics — Spectacle lenses — Fundamental requirements for uncut finished lenses*

ISO 21987, *Ophthalmic optics — Mounted spectacle lenses*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13666 and ISO 21987 apply.

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

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

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

4 Classification

Uncut finished lenses are classified as follows:

a) single-vision finished lenses;

b) multifocal finished lenses;

c) power-variation finished lenses.

5 Requirements

5.1 Reference temperature

The tolerances shall apply at a temperature of 23 °C ± 5 °C.

5.2 Optical requirements

5.2.1 General

The optical characteristics shall be verified using a focimeter conforming to the requirements of ISO 8598-1.

The optical tolerances shall apply at the reference point(s) of the lens at one of the reference wavelengths specified in ISO 7944.

If the manufacturer states a verification power, then the ranges and tolerances in Table 1 to Table 4 shall be chosen according to and applied to the verification power. In this case, the verification power may be stated by the manufacturer on the package or in an accompanying document.

5.2.2 Back vertex power of power-variation lenses at the primary reference point

When verified according to 5.2.1, spectacle lenses shall comply with the tolerances on the power of each principal meridian (see Table 1, second column), and with the tolerances on the cylindrical power(see Table 1, third to sixth column), using the method specified in 6.2.

Table 1 — Tolerances on the back vertex power of power-variation lenses

Values in dioptres (D)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance on the absolute cylindrical power			
		≥0,00 and ≤0,75	>0,75 and ≤4,00	>4,00 and ≤6,00	>6,00
≥0,00 and ≤6,00	±0,12	±0,12	±0,18	±0,18	±0,25
>6,00 and ≤9,00	±0,18	±0,18	±0,18	±0,18	±0,25
>9,00 and ≤12,00	±0,18	±0,18	±0,18	±0,25	±0,25
>12,00 and ≤20,00	±0,25	±0,18	±0,25	±0,25	±0,25
>20,00	±0,37	±0,25	±0,25	±0,37	±0,37

5.2.3 Direction of the cylinder axis

When verified according to 5.2.1 and using the method specified in 6.3, the direction of the cylinder axis shall comply with the tolerances specified in Table 2. The cylinder axis shall be specified in accordance with ISO 8429.

NOTE There are no requirements for the axis direction for cylindrical power of less than 0,12 D.

Table 2 — Tolerances on the direction of the cylinder axis

Absolute cylindrical power dioptres (D)	<0,12	≥0,12 and ≤0,25	>0,25 and ≤0,50	>0,50 and ≤0,75	>0,75 and ≤1,50	>1,50
Tolerance on the direction of the cylinder axis degrees (°)	No requirement	±14	±7	±5	±3	±2

5.2.4 Variation power (including addition power)

When verified according to 5.2.1 using the method specified in 6.5, the variation (including addition) power shall comply with the tolerances specified in Table 3. The tolerance on the variation power for power-variation lenses applies only to lenses having primary and secondary reference points.

Table 3 — Tolerances on the variation power (including addition power)

Values in dioptres (D)

Value of the variation power (including addition power)	≤4,00	>4,00
Tolerance	±0,12	±0,18

5.2.5 Prismatic power

When verified according to 5.2.1 at the prism reference point and using the method specified in 6.4, the total prism (including ordered and thickness reduction prism) shall comply with the tolerance(s) given in Table 4. Lenses with no ordered prism are also included.

To determine the prismatic power tolerances, find the value S of the higher absolute principal power. Then:

a) if ordered as an oblique prism, resolve any ordered prism into its horizontal and vertical components;

b) determine the horizontal prism tolerances in the row in Table 4 according to the total horizontal prism component using the second column;

c) determine the vertical prism tolerances in the row in Table 4 according to the total vertical prism component using the third column.

Table 4 — Prismatic tolerance

Values in prism dioptres (Δ)

Higher total prism component value	Horizontal component	Vertical component
≥0,00 and ≤2,00	±[0,25 + (0,1 × S)]	±[0,25 + (0,05 × S)]
>2,00 and ≤10,00	±[0,37 + (0,1 × S)]	±[0,37 + (0,05 × S)]
>10,00	±[0,50 + (0,1 × S)]	±[0,50 + (0,05 × S)]
NOTE 1 S is the focal power, in dioptres, in the meridian of higher absolute principal power. NOTE 2 (0,1 × S) corresponds to the prismatic effect of 0,1 cm (1 mm) displacement, while (0,05 × S) corresponds to the prismatic effect of 0,05 cm (0,5 mm) displacement.		

NOTE An example of applying the tolerances given in Table 4 to a distance power of +0,50 D sphere /–2,50 D cylinder axis 20° in a progressive prescription with a prismatic power of not greater than 2,00 Δ is as follows.

For this prescription, the principal powers are +0,50 D and –2,00 D so that the higher absolute principal power is 2,00 D. For a power of 2,00 D, the horizontal tolerance is ±[0,25 + (0,1 × 2,00)] = ±0,45 Δ. The vertical tolerance is ±[0,25 + (0,05 × 2,00)] = ±0,35 Δ.

5.2.6 Prism base setting

The tolerances on the base setting of any prism shall be determined by verifying that the horizontal and vertical components comply with Table 4.

5.3 Requirements for size and thickness

Lens sizes are classified as follows:

a) nominal size (d_n): dimension(s), in millimetres, indicated by the manufacturer;

b) effective size (d_e): actual dimension(s), in millimetres, of the lens;

c) usable size (d_u): dimension(s), in millimetres, of the area that is optically usable.

For lenses specified by diameter, the tolerances on size shall be as follows:

— effective size, d_e:

$d_n - 1 \text{ mm} \leq d_e \leq d_n + 2 \text{ mm}$

— usable size, d_u:

$d_u \geq d_n - 2 \text{ mm}$

The tolerance on usable size does not apply for lenses with a carrier curve, such as lenticulars.

The thickness of the lens may be specified by the manufacturer or be agreed between the orderer and the supplier.

The thickness shall be verified at the prism reference point of the front surface and normal to this surface. It shall not deviate from the specified value by more than ±0,3 mm.

As the size and thickness of lenses worked for a particular shape and size will inevitably be subject to the requirements of the spectacle frame into which the lenses are to be mounted, the tolerances on size and thickness are not applicable to these lenses. Such tolerances may be agreed between the orderer and supplier.

5.4 Orientation requirement for polarizing lenses

For polarizing lenses intended for sun glare attenuation, the plane of transmission shall be aligned at 90° ± 3° to the permanent alignment reference markings when verified according to the method in ISO 8980-3.

6 Verification methods

6.1 General

Alternative verification methods are acceptable if shown to perform equivalently to the reference test methods in Clause 6.

NOTE Verification of the powers of spectacle lenses is dependent upon various parameters including those relating to the design of the focimeter, focusing errors and, particularly lens positioning on the instrument. These apply especially for determining the near addition. For details, see ISO/TR 28980.

6.2 Verification method for back vertex power

Lenses shall be verified with the back surface of the lens against the focimeter's lens support. The lens shall be centred at the appropriate reference point. The back vertex power shall be verified according to Table 1.

6.3 Verification method for the direction of the cylinder axis

Lenses shall be verified with the back surface of the lens against the focimeter's lens support. Verify the cylinder axis direction in relation to the horizontal determined by the manufacturer's permanent alignment reference marking. The direction of the cylinder axis shall be verified according to Table 2.

6.4 Verification method for prismatic power

Lenses shall be verified with the back surface of the lens against the focimeter's lens support. The lens shall be centred at the prism reference point and the horizontal and vertical prismatic power components measured in relation to the horizontal determined by the manufacturer's permanent alignment reference markings. A prism compensating device corresponding to the prismatic power and opposite base setting may be used. The prismatic power shall be verified according to Table 4.

6.5 Verification method for variation power (including addition power)

6.5.1 General

The addition power or variation power shall be verified according to Table 3.

The surface on which the power-variation is located shall be chosen as the reference surface, in this subclause 6.5 only, for verification of the addition or variation power.

Alternatively, the manufacturer may nominate which surface of the lens shall be used as the reference surface.

NOTE Differences can occur between measurements made with different focimeters at points on a lens where prism is not zero. This is because of effects in the measurement, such as different focimeter designs, the non-linearity error of focimeters, the positioning of the lens or the amount of tilt when the lens is placed on the support and the subjective focusing error.

6.5.2 Procedure

Place the lens so that the reference surface is against the focimeter's lens support. Position the lens at the secondary reference point and measure the power at this point.

Keeping the reference surface against the focimeter's lens support, position the lens at the primary reference point and measure the power at this point.

Calculate the variation power or addition power as the difference between the power at the secondary reference point and the power at the primary reference point. These powers may be either the power measured using the nearer-to-vertical lines of the target or the spherical equivalent power.

6.6 Inspection method for material and surface quality

Material and surface quality can be assessed using the method in Annex A.

7 Marking

7.1 Permanent marking

The lens shall be permanently marked with at least the following:

a) the alignment reference marking comprising two marks located nominally 34 mm apart, equidistant to a vertical plane through the fitting point or prism reference point;