INTERNATIONAL STANDARD

ISO 8980-2

First edition
1996-02-01

Ophthalmic optics — Uncut finished spectacle lenses —

Part 2:
Specifications for progressive power lenses

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

Reference number
ISO 8980-2:1996(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8980-2 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 8, *Ophthalmic optics*.

ISO 8980 consists of the following parts, under the general title *Ophthalmic optics — Uncut finished spectacle lenses*:

— *Part 1: Specifications for single-vision and multifocal lenses*

— *Part 2: Specifications for progressive power lenses*

— *Part 3: Transmittance specifications and test methods*

Annexes A and B of this part of ISO 8980 are for information only.

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Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Ophthalmic optics — Uncut finished spectacle lenses —

Part 2:
Specifications for progressive power lenses

1 Scope

This part of ISO 8980 specifies requirements for the optical and geometrical properties for uncut finished progressive spectacle lenses.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8980. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8980 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7944:1984, *Optics and optical instruments — Reference wavelengths.*

ISO 8598:—[1], *Optics and optical instruments — Focimeters.*

ISO 8980-1:1996, *Ophthalmic optics — Uncut finished spectacle lenses — Part 1: Specifications for single-vision and multifocal lenses.*

ISO 13666:—[1], *Ophthalmic optics — Spectacles lenses — Vocabulary.*

1) To be published.

3 Definitions

For the purposes of this part of ISO 8980, the definitions given in ISO 13666 apply.

4 Classification

Finished lenses are classified as follows:

a) single-vision finished lenses;

b) multifocal finished lenses;

c) progressive power finished lenses.

5 Requirements

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

5.1 Optical requirements

5.1.1 General

The optical tolerances shall apply at the reference points of the lens at one of the reference wavelengths specified in ISO 7944.

The as-worn position can result in the apparent power to the eye being different from that determined as a result of the focimeter measurement.

If the manufacturer has applied corrections to compensate for the as-worn position, then the tolerances

shall apply to the corrected value and this corrected value shall be stated by the manufacturer on the package or in an accompanying document (see 8.1).

The measured addition power is principally influenced by the prescribed surface. In particular cases, e.g. oblique cylinders or high minus powers, the deviation of the measured addition power of finished progressive lenses can exceed the above mentioned tolerances. The manufacturer shall submit corrected values on request (see 8.2).

5.1.2 Tolerances on the power of progressive power lenses for the distance portion (back vertex power)

The optical power shall be determined using a focimeter complying with ISO 8598 or an equivalent method.

5.1.2.1 Tolerances on the power of the lenses

Spherical, aspherical and cylindrical power lenses shall comply with the tolerances on each meridian, A, and with the tolerances on the cylinder, B (see table 1).

5.1.2.2 Tolerances on the direction of cylinder axis

The tolerances on the direction of cylinder axis as specified in table 2 shall be measured using the method described in 6.2.

Table 1 — Tolerances on the power of lenses

Values in dioptres (D)

Power of meridian with highest absolute power	**Tolerance on the power of each meridian, A**	**Tolerance on the cylindrical power, B**			
		⩾ 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

Table 2 — Tolerances on the direction of cylinder axis

Cylindrical power, in dioptres	⩽ 0,50	> 0,50 and ⩽ 0,75	> 0,75 and ⩽ 1,50	> 1,50
Tolerance on the axis, in degrees	± 7	± 5	± 3	± 2

5.1.3 Tolerances on the addition power

The tolerances on the addition power as specified in table 3 shall be measured by the method described in 6.2.

5.1.4 Tolerances on optical centration and prismatic power

Within the areas centred around the design reference point there shall be a point at which the difference between the prescribed and/or the thickness reduction prism and the measured prismatic power does not exceed the values given in table 4.

Table 3 — Tolerances on the addition power

Values in dioptres (D)

Value of the addition power	⩽ 4,00	> 4,00
Tolerance	± 0,12	± 0,18

Table 4 — Tolerances on optical centration and prismatic power

Prismatic power (Δ)	**Tolerances**		
	Prism (Δ)	Horizontal (mm)	Vertical (mm)
⩾ 0,00 and ⩽ 2,00	± 0,25	1	0,5
> 2,00 and ⩽ 10,00	± 0,37		
> 10,00	± 0,50		

NOTES

1 The prismatic power specified in table 4 includes the combination of prescribed prism and any prism thinning.

2 The total prismatic tolerance at the prism reference point is the sum of the prismatic component resulting from the decentration tolerance (Prentice's rule) and the above tolerance on the prismatic power.

5.1.5 Tolerances on the base setting of prism

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

5.2 Geometrical tolerances

5.2.1 Tolerances on the size of finished lenses

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:

a) effective size, d_e:

$$d_e \geqslant d_n - 1 \text{ mm}$$

$$d_e \leqslant d_n + 2 \text{ mm}$$

b) usable size, d_u:

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

As the size and thickness of lenses worked to prescription will inevitably be subject to the needs of the size and shape of the spectacle frame that is to be glazed, the tolerances on size and thickness are not applicable to these lenses. Such tolerances may be agreed between the prescriber and the supplier.

5.2.2 Tolerances on thickness

The effective thickness shall be measured at the reference point of the front surface and normal to this surface. It shall not deviate from the nominal value by more than $\pm$ 0,3 mm.

The nominal thickness of the lens may be specified by the manufacturer or be agreed between the user and the supplier. For lenses worked to prescription, see 5.2.1.

6 Test methods

6.1 Cylinder axis and prism base setting measurement method

Measure the cylinder axis and prism base setting in relation to the horizontal determined by the manufacturer's permanent alignment reference markings.

6.2 Addition power measurement method

Place the lens so that the progressive surface is against the focimeter lens support and centralize the lens at the near reference point.

Using a focusing focimeter, measure the near vertex power after focusing the more nearly vertical lines of the target.

Then measure the distance vertex power at the distance reference point, with the progressive surface against the focimeter lens support, by focusing the lines of the target which are closest to the vertical.

Calculate the addition power as the difference between the near vertex power and the distance vertex power.

Lenses for which the addition power has been determined by the measurement method given in ISO 8980-1:1995, 6.2, are not excluded from this part of ISO 8980 for a transition period of 5 years after publication of this edition.

Alternative measurement methods are acceptable if shown to perform equivalently to the above reference method.

In the case of special conception design, if the reference method is not applicable, the manufacturer should specify the reference points for the addition measurement.

In the case of negative lenses with negative distance powers of 6,00 D or more, back vertex power measurement methods are permitted. If the lens is designed according to the back vertex power measuring method, this should be stated by the manufacturer.

If the manufacturer publishes information on the evaluation of a progressive addition lens, then the method of determination of those characteristics should be based on the method described in annex B.

6.3 Material and surface quality

See annex A.

7 Marking

7.1 Permanent marking

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

a) The alignment reference markings comprising two marks located 34 mm apart, equidistant to a vertical plane through the fitting point or prism reference point.

b) Indication of the addition power, in dioptres.

c) Indication of the manufacturer, or supplier, or tradename, or trademark.

Lenses, on which the reference marking is not located in accordance with a) and lenses which are not inscribed with the tradename or manufacturer's name are not excluded from this part of ISO 8980 for a transition period of 5 years after publication of this edition.

7.2 Optional non-permanent marking

The following optional non-permanent marking is recommended:

a) the alignment reference marking;

b) indication of the distance reference point;

c) indication of the near reference point;

d) indication of the fitting point;

e) indication of the prism reference point.

8 Identification

8.1 Identification of the lens to be stated on the package of the lens or in an accompanying document

The following information shall be stated:

a) dioptric power, in dioptres;

b) nominal lens size, in millimetres;

c) colour (if not white);

d) identification of any coating;

e) material tradename or refractive index and manufacturer's or supplier's tradename or equivalent;

f) addition power and corrected values for the as-worn position (if applicable), in dioptres (see 5.1.1);

g) an indication stating right lens or left lens (if applicable);

h) style designation or tradename;

i) corrected values for optical centration and prismatic power, if corrections have been made for the as-worn position (see 5.1.1).

8.2 Information to be made available

The following information shall be available on request:

a) centre or edge thickness, in millimetres;

b) base curve, in dioptres;

c) optical properties (including constringence and spectral transmittance);

d) prism thinning (if applicable);

e) centration chart for the reconstruction of the non-permanent markings relative to the permanent markings.

9 Reference to this part of ISO 8980

If the manufacturer or supplier claims compliance with this part of ISO 8980, reference shall be made to ISO 8980-2 either on the package or in available literature.

Annex A
(informative)

Material and surface quality

A.1 Assessment

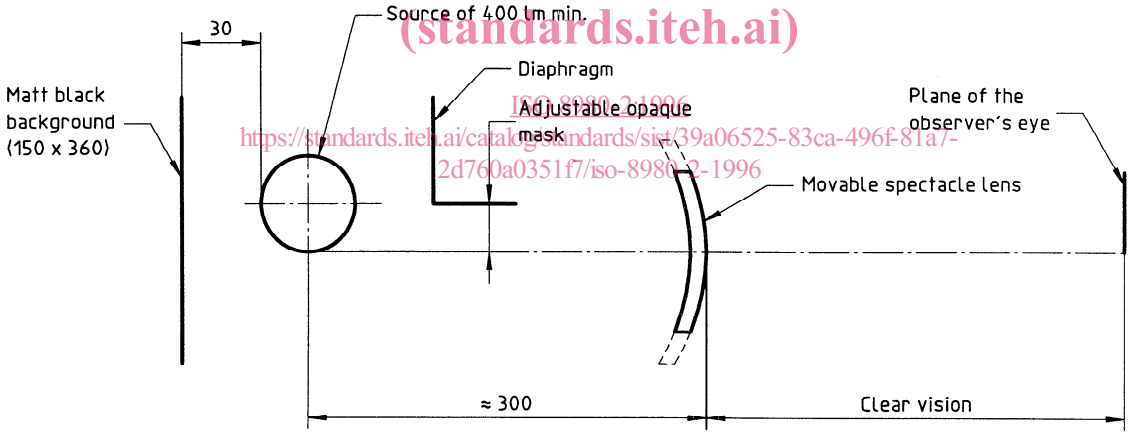
In a zone of 30 mm diameter, centred around the prism reference point, the lens should not exhibit any defect either internally or on the surfaces which may impair vision. Outside this zone, small isolated material and/or surface defects are acceptable.

A.2 Test method

Carry out the lens inspection at a light/dark boundary and without the aid of magnifying optics. The recommended system is shown in figure A.1. Inspect the lens within a room with ambient lighting of about 200 lx. Use a source of at least 400 lm as an inspection lamp, for example a fluorescent tube of 15 W or an open shade 40 W incandescent clear lamp.

NOTE 1 This observation method is subjective and requires some experience.

Dimensions in millimetres



NOTE — The diaphragm is adjusted to shield the eye from the light source and to allow the lens to be illuminated by the light.

Figure A.1 — Recommended system for visually inspecting a lens for defects

Annex B
(informative)

Method for evaluating progressive addition lens characteristics

B.1 The purpose of this annex is to provide a method for assessing certain optical properties of progressive addition lenses. There is no intention to standardize what the optics should be nor how those optics affect the use or acceptance of these lenses.

Other methods which provide measurements that are equivalent to those determinations using this method are also acceptable.

B.2 The characterization may be composed of several parameters, but should at least include spherical equivalent and astigmatism, as follows:

a) spherical equivalent is the mean of the two principal meridian powers (F_1 and F_2) at any point on the lens;

b) astigmatism is the difference between the principal meridian powers.

It is possible also to measure and plot other parameters such as the prism.

Future developments may indicate which measures are the most useful.

A focimeter which meets the requirements of ISO 8598 and which has been specially adapted for the purpose should be used for measuring these characteristics in the as-worn position. The manufacturer should specify the aperture used in the measuring instrument.

The principal ray path (or the instrument axis, if applicable) should intersect both the measuring point and the optical centre of rotation of the eye (see figure B.1). It should be possible to adjust the angle δ' to at least $\pm$ 40° from the fitting point in all directions except for the downward direction for which it should be greater than or equal to 45°.

Dimensions in millimetres

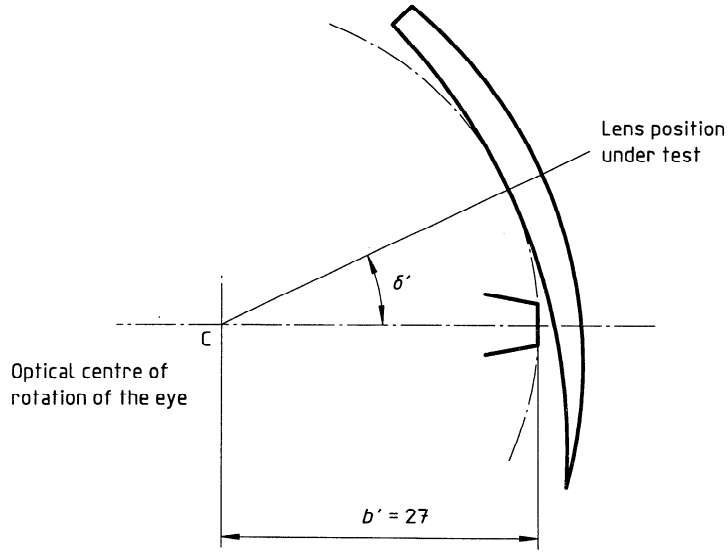


Figure B.1 — Measurement of the optical characteristics in the as-worn position