INTERNATIONAL STANDARD

ISO 10322-2

Second edition
1996-02-01

Ophthalmic optics — Semi-finished spectacle lens blanks —

Part 2: Specifications for progressive power lens blanks

Optique ophtalmique — Verres de lunettes semi-finis —
Partie 2: Spécifications pour les verres progressifs

Reference number
ISO 10322-2:1996(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 10322-2 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 8, *Ophthalmic optics*.

This second edition cancels and replaces the first edition (ISO 10322-2:1991), which has been technically revised.

ISO 10322 consists of the following parts, under the general title *Ophthalmic optics — Semi-finished spectacle lens blanks*:

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

— *Part 2: Specifications for progressive power lens blanks*

Annexes A, B and C of this part of ISO 10322 are for information only.

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Ophthalmic optics — Semi-finished spectacle lens blanks —

Part 2:
Specifications for progressive power lens blanks

1 Scope

This part of ISO 10322 specifies requirements for the optical and geometrical properties of semi-finished progressive power spectacle lens blanks. The requirements for semi-finished single-vision and multifocal lens blanks are given in ISO 10322-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 10322. 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 10322 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 10322-1:1996, *Ophthalmic optics — Semi-finished spectacle lens blanks — Part 1: Specifications for single-vision and multifocal lens blanks.*

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

1) To be published.

3 Definitions

For the purposes of this part of ISO 10322, the definitions given in ISO 13666 apply.

4 Classification

Semi-finished lens blanks are classified as follows:

a) single-vision semi-finished lens blanks;

b) multifocal semi-finished lens blanks;

c) progressive power semi-finished lens blanks.

5 Requirements

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

5.1 Optical requirements on the finished surface

5.1.1 General

The optical tolerances shall apply at the reference points of the semi-finished lens blank 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 focimeter determination.

If the manufacturer has applied corrections to compensate for the as-worn position (see annex B), 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).

5.1.2 Tolerances on the surface power of semi-finished progressive power lens blanks

The tolerances on the surface power as specified in table 1 shall apply at the distance design reference point and shall be measured using the method described in 6.1.

5.1.3 Tolerances on the addition power

The tolerances on the addition power as specified in table 2 shall apply at the design reference points and shall be measured using the method described in 6.2.

5.2 Geometrical tolerances

5.2.1 Tolerances on the size of lens blanks

The sizes of lens blanks 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 blank;

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

The tolerances on size shall be as follows:

a) effective size:

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

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

b) usable size:

$$d_u \geqslant d_n - 1 \text{ mm for } d_n \leqslant 65 \text{ mm}$$

$$d_u \geqslant d_n - 2 \text{ mm for } d_n > 65 \text{ mm}$$

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

5.2.2 Tolerances on thickness

5.2.2.1 Centre thickness

The centre thickness of the lens blank, when measured at its geometric centre (unless otherwise stated by the manufacturer), shall be not less than the minimum thickness stated by the manufacturer with a tolerance of $^{+3}_{0}$ mm.

Table 1 — Tolerances on the surface power

Values in dioptres (D)

Distance surface power of the meridian with the highest absolute distance surface power	Tolerance on distance surface power $\frac{F_1 + F_2}{2}$	Tolerance on astigmatism specified by the manufacturer[1)] $\lvert F_1 - F_2 \rvert$
$\geqslant$ 0,00 and $\leqslant$ 10,00	± 0,09	0,09
> 10,00 and $\leqslant$ 15,00	± 0,12	0,12
NOTE — F_1 and F_2 are the surface powers of the principal meridians.		
1) Relative to the intended surface astigmatism of the lens design.		

Table 2 — Tolerances on the addition power

Values in dioptres (D)

Addition power	Tolerance
⩽ 4,00	± 0,12
> 4,00	± 0,18

5.2.2.2 Edge thickness

When measured at the point stated by the manufacturer, the edge thickness of the lens blank shall be not less than the minimum thickness stated by the manufacturer with a tolerance of $^{0}_{+3}$ mm.

6 Test methods

6.1 Measurement method for the surface power at the distance design reference point

Determine the surface power at the distance design reference point by measurement of the concave spherical curve, thickness and back vertex power and then deriving, by calculation, the convex surface power.

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

6.2 Addition power measurement method

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

Using a focusing focimeter, measure the near vertex power after focusing the lines of the target which are closest to the vertical.

Then measure the distance vertex power at the distance design 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.

Lens blanks for which the addition power has been determined by the measurement method given in ISO 10322-1:1995, 6.3, are not excluded from this part of ISO 10322 for a transition period of 5 years after publication of the first edition of ISO 10322-1 (1991-12-15).

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

6.3 Material and surface quality

See annex A.

7 Marking

7.1 Permanent marking

The lens blank shall be permanently marked on the finished surface with at least 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 the tradename or trademark.

Lens blanks, on which the reference marking is not located in accordance with a) and lenses which are not inscribed with the tradename, trademark or manufacturer's name, are not excluded from this part of ISO 10322 for a transition period of 5 years after publication of the first edition of ISO 10322-1 (1991-12-15).

7.2 Optical non-permanent marking

The following optional non-permanent marking is recommended:

a) the alignment reference marking;

b) the indicator of the distance design reference point;

c) the indicator of the near design reference point;

d) the indicator of the fitting point;

e) the indicator of the prism reference point.

8 Identification

8.1 Identification required on the package

The lens blank shall be supplied in a package. This package shall be labelled with at least the following information (see also clause 9):

a) nominal surface power, in dioptres;

b) nominal size of the lens blank, in millimetres;

c) colour (if not white);

d) identification of any coating;

e) material of which the lens blank is made, its refractive index or the tradename indicating the material or equivalent;

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

g) style designation or trademark;

h) an indication stating right lens or left lens (if applicable).

8.2 Information to be made available

The following information shall be available on request:

a) the minimum centre thickness, in millimetres, and if not at the geometric centre where measured (see 5.2.2.1);

b) the minimum edge thickness, in millimetres, and identification of the measurement point (see 5.2.2.2);

c) the radius of curvature both of the finished surface (measured at the distance design reference point) and of the unfinished surface, in millimetres;

NOTE 1 For lens blanks where the curvature of the front surface is not truly spherical at the distance design reference point then an equivalent radius of curvature may be specified.

d) the optical properties (including constringence and spectral transmittance);

e) if different from 6.2, the method of measuring the addition power;

f) the prism thinning (if applicable);

g) the centration chart for the reconstruction of the non-permanent markings relative to the permanent markings;

h) if the manufacturer publishes information on the evaluation of a progressive addition lens, then the method of determination of those characteristics is to be based upon the method described in annex B;

i) the nominal distance surface cylinder, in dioptres (if applicable).

9 Reference to this part of ISO 10322

If the manufacturer or supplier claims compliance with this part of ISO 10322, reference shall be made to ISO 10322-2 either on the package or in the available literature.

Annex A
(informative)

Material and surface quality

A.1 Assessment

A.1.1 Finished surface

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

A.1.2 Unfinished surface

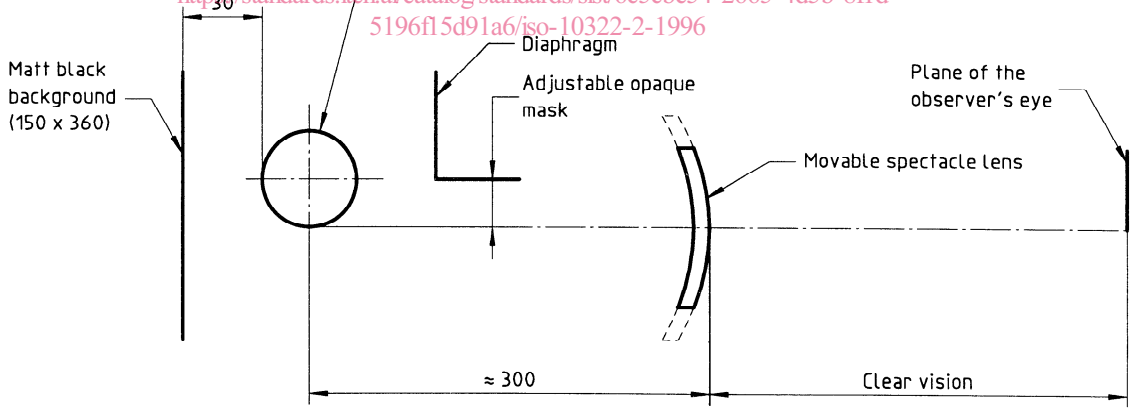
The surface quality of the unfinished surface should be sufficient to allow the determination of the addition power and to allow the use of projection type layout markers.

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 2 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 + 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

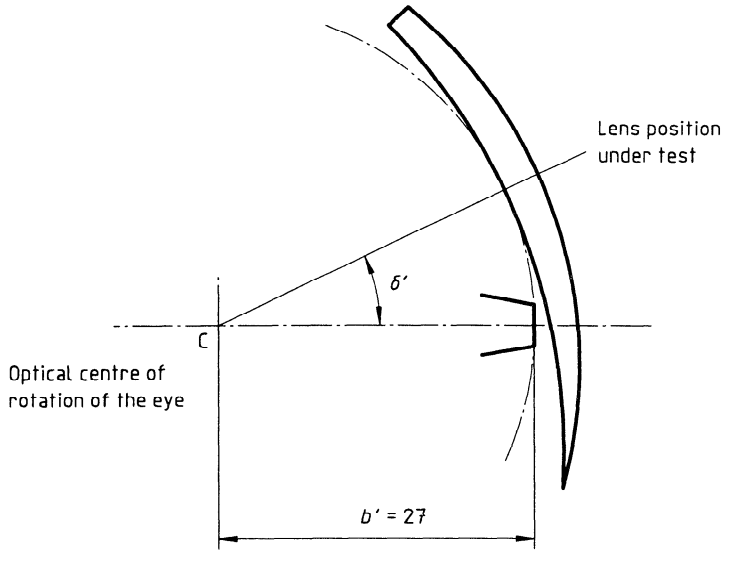


Figure B.1 — Measurement of the optical characteristics in the as-worn position

For progressive addition lens blank characteristics a measurement with infinity distance has been chosen.

The recommended representations of the optical measurements across the lens are contour plot diagrams.

The reference test lenses for semi-finished lens blanks of base curve specified by the manufacturer's surfacing chart should have the following characteristics:

distance power: plan

addition power: + 2,00 D

For other base curves and addition powers the manufacturer will indicate the base curve, distance power and addition power of the lenses used.