INTERNATIONAL STANDARD

ISO 10322-2

Third edition
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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
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 10322-2 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 10322-2:1996), 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*

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.

NOTE The requirements for semi-finished single-vision and multifocal lens blanks are given in ISO 10322-1.

2 Normative references

The following referenced documents are indispensable for the application 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 8598, *Optics and optical instruments — Focimeters*

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

3 Terms and definitions

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

3.1
focal-point-on-axis focimeter
FOA focimeter
focimeter in which the focal point of the beam remains on the axis of the focimeter when the lens under test is measured at a point on the lens where prism is not zero

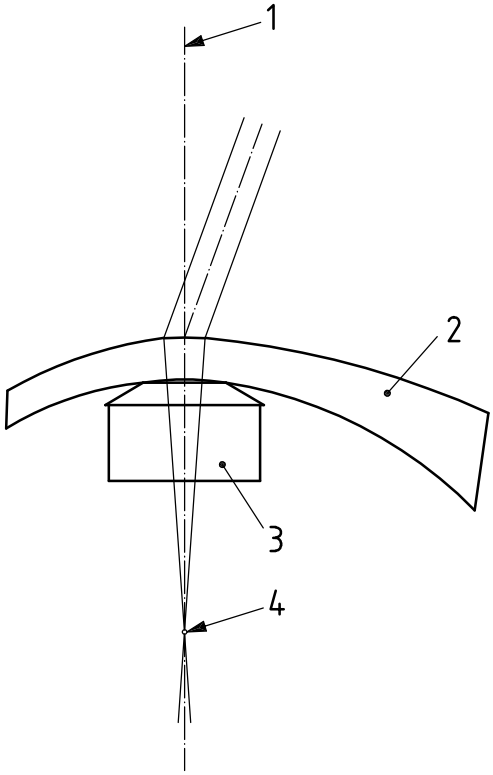
See Figure 1.

NOTE Examples of this design include all manual focusing focimeters and some automatic focimeters.

3.2
infinite-on-axis focimeter
IOA focimeter
focimeter in which the collimated beam coincides with the focimeter axis and the focal point of the beam goes off the axis of the focimeter when the lens under test is measured at a point of the lens where prism is not zero

See Figure 2.

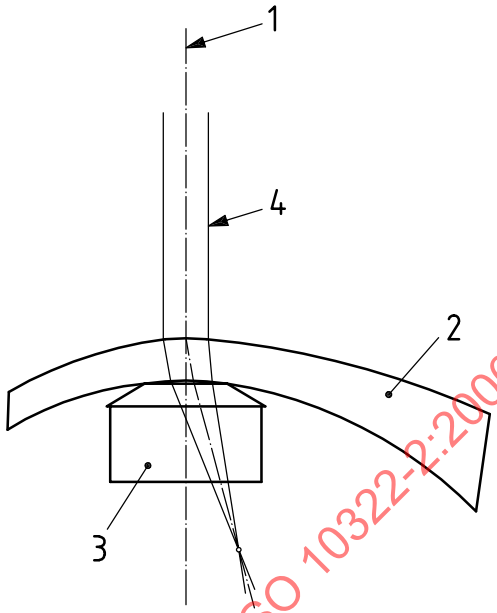
NOTE Some automatic focimeters use this design.



Key

1 focimeter's optical axis
2 lens
3 focimeter lens support
4 focal point on the optical axis

Figure 1 — FOA Focimeter



Key

1 focimeter's optical axis
2 lens
3 focimeter lens support
4 parallel incident beam coincides with optical axis

Figure 2 — IOA Focimeter

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 for the finished surface

5.1.1 General

The optical tolerances shall apply to the manufacturer's stated values at the reference points of the semi-finished lens blank at one of the reference wavelengths specified in ISO 7944.

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.

Table 1 — Tolerances on the surface power

Values in dioptres (D)

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

5.1.3 Tolerances on the addition power for progressive power lens blanks

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.

Table 2 — Tolerances on the addition power

Values in dioptres (D)

Addition power	Tolerance
$\leqslant$ 4,00	$\pm$ 0,12
$>$ 4,00	$\pm$ 0,18

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;

1) effective size, d_e:

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

2) usable size, d_u:

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

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

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 neither less than the minimum thickness stated by the manufacturer nor exceed this minimum thickness by more than 3 mm.

5.2.2.2 Edge thickness

When measured at the point stated by the manufacturer, the edge thickness of the lens blank shall be neither less than the minimum thickness stated by the manufacturer nor exceed this minimum thickness by more than 3 mm.

6 Test methods

Alternative measurement methods are acceptable if shown to perform equivalently to the reference test methods in this clause.

NOTE A lens blank measured with a focimeter calibrated for the mercury e-line reference wavelength can show a difference in power when compared to the same lens blank measured at the same point using a focimeter calibrated for the helium d-line.

6.1 Determination of the convex 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.

6.2 Addition power measurement

6.2.1 General

Addition power shall be measured using a focimeter meeting the requirements of ISO 8598.

The surface chosen for measurement shall be the progressive side unless otherwise stated by the manufacturer. There are two addition power measurement methods: front surface and back surface measurement.

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

6.2.2 Front surface method for addition power measurement

Place the lens blank so that the front surface is against the focimeter lens support, position the lens blank at the near design reference point and measure the near power.

Keeping the front surface against the focimeter support, position the lens blank at the distance design reference point and measure the distance power.

Calculate the addition power as the difference between the near power and the distance power. Near power and distance power may be either the power measured using the nearer to vertical lines of the target or the spherical equivalent power.

6.2.3 Back surface method for addition power measurement

Place the lens blank so that the back surface is against the focimeter lens support, position the lens blank at the near design reference point and measure the near power.

Keeping the back surface against the focimeter support, position the lens blank at the distance design reference point and measure the distance power.

Calculate the addition power as the difference between the near power and the distance power. Near and distance power may be either the power measured using the nearer to vertical lines of the target or the spherical equivalent power.

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 addition power, in dioptres;

c) indication of the manufacturer or supplier, or the trade name or trademark.

7.2 Optional 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. The package shall be labelled with at least the following information (see also Clause 9).

a) nominal surface power, in dioptres;

b) surface astigmatic power, in dioptres (if applicable);

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

d) colour (if not white);

e) identification of any coating;

f) material of which the lens blank is made, its refractive index or the trade name indicating the material or equivalent;

g) addition power, in dioptres;

h) style designation or trade name or trademark;

i) an indication stating right 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; 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 Abbe number and spectral transmittance);

e) the method of measurement of the addition power used by the manufacturer including focimeter type (FOA or IOA), front or back surface method and focimeter calibration reference wavelength;

f) the prism thinning (if applicable);

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

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 marking, inspection and measurement.

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 This observation is subjective and requires some experience.