INTERNATIONAL STANDARD

ISO 10322-1

Third edition
2006-02-01

Ophthalmic optics — Semi-finished spectacle lens blanks —

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

Optique ophtalmique — Verres de lunettes semi-finis —

Partie 1: Spécifications pour les verres unifocaux et multifocaux

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 10322-1 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 10322-1:1996), 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 1:
Specifications for single-vision and multifocal lens blanks

1 Scope

This part of ISO 10322 specifies requirements for the optical and geometrical properties of semi-finished single-vision and multifocal spectacle lens blanks.

NOTE The requirements for semi-finished progressive power lens blanks are given in ISO 10322-2.

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

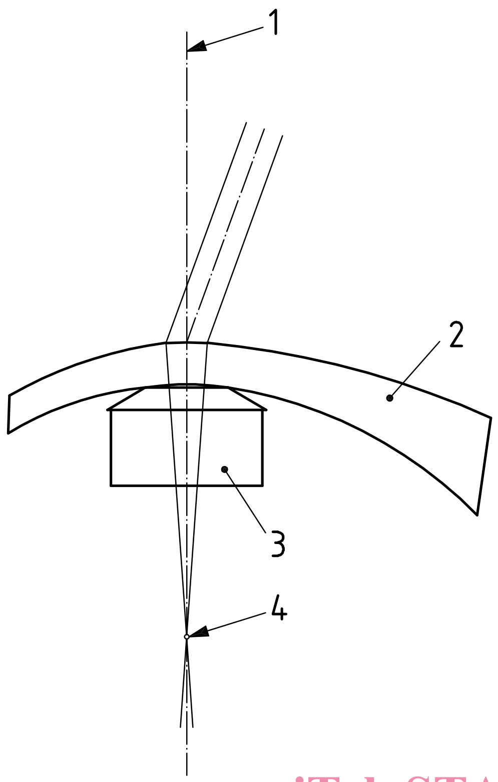
See Figure 1.

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

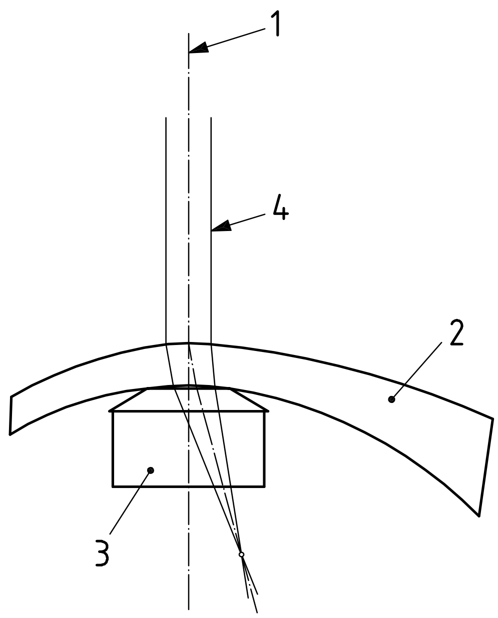
1 focimeter's optical axis

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.

In the case of an aspheric lens blank, the distance reference point shall be specified by the manufacturer. If no distance reference point is identified, the blank geometric centre may be assumed to be the distance reference point.

5.1.2 Tolerances on the surface power of semi-finished single-vision and multifocal blanks

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

Table 1 — Tolerances on the surface power for nominally spherical surfaces

Values in dioptres (D)

Surface power of the principal meridian with the higher absolute surface power	Tolerance on surface power $\frac{F_1 + F_2}{2}$	Tolerance on astigmatic surface power for spherical surfaces $\lvert F_1 - F_2 \rvert$
$\geqslant$ 0,00 and $\leqslant$ 2,00	± 0,09	0,04
> 2,00 and $\leqslant$ 10,00	± 0,06	0,04
> 10,00 and $\leqslant$ 15,00	± 0,09	0,04
> 15,00 and $\leqslant$ 20,00	± 0,12	0,06
> 20,00	± 0,25	0,06
F_1 and F_2 are the surface powers of the principal meridians.		

5.1.3 Uniformity of the surface power of lenses with spherical surfaces

Over a zone of 40 mm diameter centred around the design reference point, the surface power shall not deviate by more than 0,06 D from the surface power measured at the design reference point. The uniformity shall be determined using one of the methods described in 6.2.

5.1.4 Tolerances on the surface cylindrical power

The tolerances on the surface cylindrical power as specified in Table 2 shall apply at the design reference point and shall be measured using the method described in 6.1.

Table 2 — Tolerances on the surface cylindrical power for cylindrical surfaces

Values in dioptres (D)

Cylindrical power	Tolerance
$\geqslant$ 0,25 and $\leqslant$ 4,00	± 0,06
> 4,00 and $\leqslant$ 6,00	± 0,09
> 6,00	± 0,12

5.1.5 Tolerances on the addition power for multifocal lens blanks

The tolerances on the addition power as specified in Table 3 shall apply at the design reference points and shall be measured using the method described in 6.3.

Table 3 — Tolerances on the addition power

Values in dioptres (D)

Addition power	Tolerance
$\leqslant$ 4,00	± 0,12
> 4,00	± 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:

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

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

The tolerance on usable size does not apply to blanks for lenses 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 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.

5.2.3 Segment tolerances for multifocal lens blanks

5.2.3.1 Dimensions

When using one of the methods described in 6.4, each of the segment dimensions (width, depth and intermediate depth) shall not deviate from its nominal value by more than ± 0,5 mm.

If sold as a matched pair, each of the segment dimensions (width, depth and intermediate depth) shall not differ by more than 0,7 mm.

5.2.3.2 Positions

The segment position shall be measured from the distance design reference point using the measurement method described in 6.4. The horizontal position (segment inset) shall be the distance, in millimetres, from the distance design reference point to the vertical bisector of the segment. The vertical position (vertical segment displacement) shall be the distance, in millimetres, from the distance design reference point to the segment line (or highest point of the segment for segments with curved tops).

Neither the horizontal nor the vertical position shall deviate from the nominal value by more than ± 1,0 mm.

Segment size and position tolerances are applicable only if the segment boundaries are clearly delineated.

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 surface power at the design reference point

Determine the surface power at the design reference point using a precision dial indicator capable of measuring a toroidal surface and which has been calibrated against reference test lenses.

6.2 Measurement method for uniformity of the surface power of spherical surfaces

Determine the surface power uniformity over a 40 mm diameter circle centred on the design reference point using either a Newton's ring test or a calibrated sagittal height gauge.

6.3 Addition power measurement

6.3.1 General

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

The surface chosen for measurement shall be the segment 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 different focimeter design (IOA or 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.

6.3.2 Front surface method for addition power measurement

Establish Point D (see Figure 3), which is the symmetrical point of N with respect to B. If the position of Point N is not specified, choose a point 5 mm below the top centre of the segment as Point N.

Place the lens blank so that the front surface is against the focimeter lens support, centralize the lens blank at Point N and measure the near power.

Keeping the front surface against the focimeter support, centralize the lens blank at D (see Figure 3) 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.