INTERNATIONAL STANDARD

ISO 10322-1

Second edition
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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
ISO 10322-1:1996(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 10322-1 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 10322-1:1991), 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*

Annex A of this part of ISO 10322 is for information only.

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

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

3 Definitions

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

1) To be published.

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 result of the focimeter measurements.

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 7.1).

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

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.

5.1.5 Tolerances on the addition power and prismatic power for multifocal lens blanks

5.1.5.1 Tolerances on the addition power

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.

5.1.5.2 Tolerances on the prism in the segment

The deviation from the prism shall not exceed 0,25 Δ when measured at the near design reference point.

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

Values in dioptres (D)

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

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

Values in dioptres (D)

Cylindrical power	Tolerance
> 0,25 and ⩽ 4,00	± 0,06
> 4,00 and ⩽ 6,00	± 0,09
> 6,00	± 0,12

Table 3 — Tolerances on the addition power

Values in dioptres (D)

Addition power	Tolerance
⩽ 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.

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 $^{0}_{+3}$ 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 not less than the minimum thickness stated by the manufacturer with a tolerance of $^{0}_{+3}$ 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 deviate from its nominal value 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 the 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 or if the segment does not reach the edge of the blank.

6 Test methods

6.1 Measurement method for 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 the Newton ring test or a calibrated sagittal height gauge.

6.3 Addition power measurement method

Place the lens blank so that the surface containing the addition segment is against the focimeter lens support and centralize the lens blank at the near design reference point N (see figure 1).

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

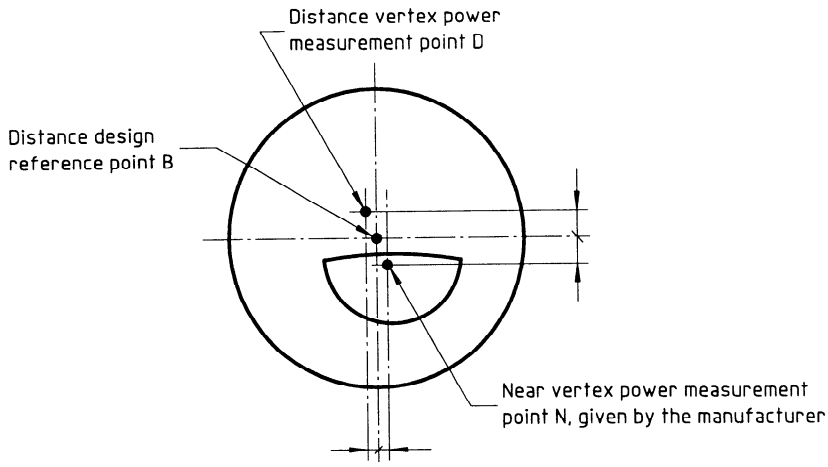


Figure 1 — Measurement of the addition power

Establish the distance vertex power measurement point D (see figure 1), which is at the same distance above and to the side of the distance design reference point B as the near vertex power measurement point N is from B. Then place the lens blank against the focimeter lens support and centralize the lens blank at D. Measure the distance vertex power after 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.

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

In the case of an aspheric lens blank, the distance reference point and the method of measurement should be specified by the manufacturer.

6.4 Segment size and position measurement method

Measure the segment size in the tangential plane to the centre of the segment and measure the position in plan view using a shadowgraph, an optical comparator fitted with the appropriate graticule or a precision millimetric measuring instrument.

6.5 Material and surface quality

See annex A.

7 Identification

7.1 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 8):

a) for all lens blanks

1) nominal surface power, in dioptres,

2) nominal surface cylindrical power, in dioptres (if applicable),

3) nominal size of the lens blank, in millimetres,

4) colour (if not white),

5) identification of any coating,

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

7) tradename of the manufacturer or supplier,

b) for multifocal lens blanks

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

2) style designation or trademark,

3) width or segment dimension(s), in millimetres (if applicable),

4) an indication stating right lens or left lens (if applicable),

5) segment prism, in prism dioptres (if applicable).

7.2 Informations 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 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 reference point then an equivalent radius of curvature may be specified.

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

e) if different from 6.3, the method of measuring the addition power.

8 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 10322-1 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 reference point and also over the whole area of the segment if the segment is not more than 30 mm in diameter, the lens blank should not exhibit any defect either internally or on the finished surface which may impair vision. For segments over 30 mm in diameter, the inspection area should also include a 30 mm diameter zone centred around the near design reference point. Outside this zone, small isolated material and/or surface defects are acceptable.

A.1.2 Unfinished surface

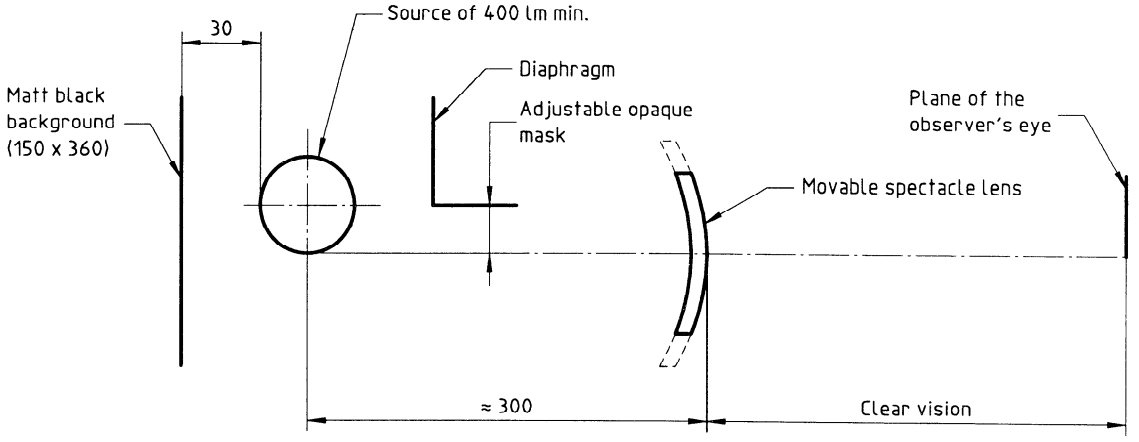
The surface quality of the unfinished surface should be sufficient to allow if necessary the determination of the addition power and to allow the use of projection type layout markers.

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

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