INTERNATIONAL STANDARD

ISO 10322-2

First edition
1991-12-15

Ophthalmic optics — Semi-finished lens blanks —

Part 2:
Specifications for progressive power lens blanks

Optique ophtalmique — Verres semi-finis —

Partie 2: Spécifications pour les verres progressifs

Reference number
ISO 10322-2:1991(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*, Sub-Committee SC 8, *Ophthalmic optics*.

ISO 10322 consists of the following parts, under the general title *Ophthalmic optics — Semi-finished 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.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Ophthalmic optics — Semi-finished lens blanks —

Part 2:
Specifications for progressive power lens blanks

1 Scope

This part of ISO 10322 specifies requirements for the optical and geometric properties of semi-finished progressive power lens blanks.

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

ISO 10322-1:1991, *Ophthalmic optics — Semi-finished lens blanks — Part 1: Specifications for single-vision and multifocal lens blanks.*

3 Definitions

For the purposes of this part of ISO 10322, the following definitions apply.

3.1 semi-finished blanks: Semi-finished blanks are composed of two surfaces: a finished surface and an unfinished surface.

3.1.1 single-vision semi-finished blanks: Blanks which, after surfacing, are designed to provide a single corrective power.

3.1.2 multifocal semi-finished blanks: Blanks which, after surfacing, are designed to provide two or more corrective powers over different areas.

NOTE 1 This definition includes blanks with blended segments.

3.1.3 progressive power semi-finished blanks: Blanks which, after surfacing, are designed to provide a continuous change rather than discrete changes of corrective power over a part or the whole of the surface.

NOTE 2 Some lens designs may incorporate characteristics of both multifocal and progressive power blanks. In these cases, manufacturing tolerances would apply in accordance with the most appropriate classification of the characteristic.

3.2 corrective power: A general term comprising the spherical and cylindrical vertex power as well as the prismatic power of an ophthalmic lens.

3.3 vertex power: There are two vertex powers of a lens:

a) back vertex power [expressed in dioptres (D)]: the reciprocal of the paraxial back vertex focal length measured in metres;

b) front vertex power [expressed in dioptres (D)]: the reciprocal of the paraxial front vertex focal length measured in metres.

NOTE 3 In accordance with convention, the back vertex power is specified as the "power" of a corrective lens; the front vertex power is, however, required for certain purposes, e.g. in the measurement of addition power.

1) To be published.

3.4 prismatic power: The deviation of a ray of light through a specified point on a lens.

NOTE 4 The unit is the prism dioptre (Δ) and is expressed in centimetres deviation per metre distance (cm/m).

3.5 prism reference point: That point on a lens blank stipulated by the manufacturer at which the prism values of the finished lens are determined.

NOTE 5 The measured prism will be the resultant of the prescribed prism and prism thinning.

3.6 distance design reference point: That point on the lens blank stipulated by the manufacturer at which the design specifications for the distance portion are to apply.

NOTE 6 The distance design reference point is assumed to be the blank geometric centre unless otherwise stated.

3.7 fitting point: That point on a lens blank stipulated by the manufacturer as a reference point for positioning the lens in front of a patient's eye.

3.8 alignment reference marking: The markings provided by manufacturers to establish the proper rotational alignment of the lens blank (0 to 180° line), or to re-establish other reference points.

3.9 near design reference point: That point on a lens blank stipulated by the manufacturer at which the design specifications for the near portion are to apply.

3.10 surface power, F: The ability of a surface (or part of a surface) to change the vergence of a paraxial beam of light incident normally at the surface.

For calculation purposes of the second surface, one can use the following general formula for the area around the distance design reference point in accordance with the specification of the manufacturer.

NOTE 7 Surface power is calculated from the equation

$$F = (n - 1)/r$$

where

r is the radius of curvature, in metres;

n is the refractive index of the material.

F is positive for convex surfaces and negative for concave surfaces. It is expressed in dioptres (D).

3.11 nominal surface power: The surface power stated by the manufacturer for purposes of identification.

3.12 addition power: The difference between the vertex power of the near portion and the vertex power of the distance portion.

NOTE 8 See 6.2 for measurement.

4 Classification

Semi-finished lens blanks are classified as follows:

a) single-vision semi-finished blanks;

b) multifocal semi-finished blanks;

c) progressive power semi-finished blanks.

5 General requirements

NOTE 9 The tolerances apply for a temperature of 23 °C ± 5 °C.

5.1 Optical tolerances of the finished surface

5.1.1 Surface power

The maximum tolerances on the nominal surface power as specified in table 1 shall apply at the distance design reference point and shall be measured using the method described in 6.3.

Table 1 — Tolerances on surface power

Values in dioptres

Distance surface power	Tolerance on surface power $\frac{F_1 + F_2}{2}$	Tolerance on astigmatism specified by the manufacturer $F_1 - F_2$
0,00 to 10,00	± 0,09	0,09
> 10,00 to 15,00	± 0,12	0,12

5.1.2 Addition power

When measured by the method described in 6.2, the tolerances on the addition power up to 4,00 D shall be as specified in table 2.

Table 2 — Tolerances on addition power

Values in dioptres

Distance surface power	Tolerance on addition power
0,00 to 15,00	± 0,12
> 15,00	± 0,18

5.2 Material and surface quality

5.2.1 Finished surface

In a zone of 40 mm diameter, centred around the prism reference point, the lens blank when inspected using the method of 6.1 shall not exhibit any defect internally or on the finished surface which can impair the vision.

NOTE 10 Outside this zone, small isolated material and/or surface defects are acceptable.

5.2.2 Unfinished surface

In the case of a progressive semi-finished blank, the surface quality of the unfinished surface should be of sufficient quality to allow, if necessary, inspection of the lens blank, to determine the addition power and to allow the use of projection type layout markers.

5.3 Geometric tolerances

5.3.1 Dimensions of blanks

5.3.1.1 Sizes of blanks

The sizes of 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 and is free from the presence of bevels, edge defects, etc.

NOTE 11 Isolated peripheral identification marks, peripheral flaws, chips and bubbles are acceptable.

5.3.1.2 Tolerances on minimum size

a) effective size:

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

b) usable size:

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

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

NOTE 12 The tolerance on usable size does not apply to blanks with a carrier curve such as lenticulars.

5.3.2 Thickness

5.3.2.1 Centre thickness

When measured at the geometric centre of the lens blank, unless otherwise stated by the manufacturer, the centre thickness of the lens blank shall be not less than the minimum thickness stated by the manufacturer.

5.3.2.2 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.

6 Test methods

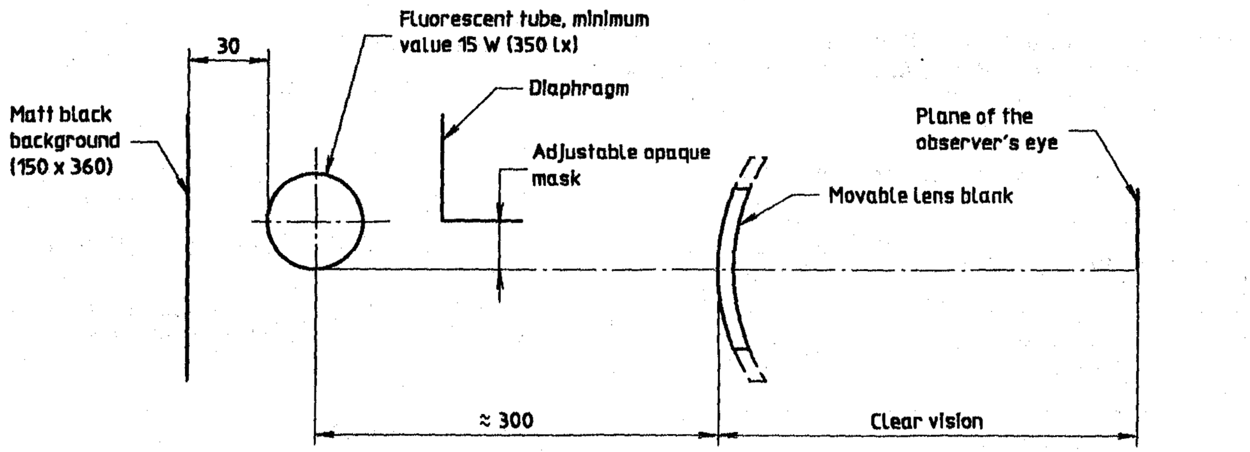
The measurement of optical power shall be carried out in accordance with ISO 8598 or an equivalent method.

6.1 Material and surface quality

The lens inspection is carried out at a light/dark boundary and without the aid of magnifying optics. Inspect the lens within a room with lighting of about 200 lx. Use as an inspection lamp either a fluorescent tube with a minimum of 15 W or an open-shaded 40 W incandescent clear lamp. Position the lens about 300 mm from the light source and view against a dark background (see figure 1).

NOTE 13 This observation 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 1 — Recommended system for visually inspecting a lens for defects

6.2 Addition power measurement method

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

When using a focusing focimeter, measure the near vertex power by focusing the most vertical lines of the target.

Calculate the addition as the difference between the near vertex power and the distance vertex power measured on the same progressive surface at the distance design reference point.

Lens blanks where the addition power is designed in accordance with the measurement method given in 6.2 of ISO 10322-1 are not excluded by this part of ISO 10322 for a transition period of 5 years.

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

Determine the surface power at the distance design reference point using any method of sufficient accuracy. An example of one such method is measurement of the concave spherical curve, thickness and back vertex power and then deriving by calculation the convex surface power.

7 Marking

7.1 Permanent marking

The lens blank shall be permanently marked as follows.

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

NOTE 14 Lens blanks where the reference marking is not located at a distance of 34 mm are not excluded by this part of ISO 10322 for a transition period of 5 years.

b) Indication of the addition power.

c) Indication of the manufacturer or supplier, or the trade name or trade mark.

NOTE 15 Lens blanks, where the trade names or manufacturer names are not inscribed, are not excluded by this part of ISO 10322 for a transition period of 5 years (see 6.2).

7.2 Non-permanent marking (if requested)

a) Alignment reference marking.

b) Indicator of the distance design reference point.

c) Indicator of the near design reference point.

d) Indicator of the fitting point.

e) 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) The nominal surface power, in dioptres.

b) The nominal size of the lens blank, in millimetres.

c) The colour (if not white).

d) The material of the blank, its refractive index and the trade name of the manufacturer or supplier.

e) The addition power, in dioptres.

f) The style designation or trade mark.

g) If applicable, right or left eye.

8.2 Information to be made available

The following information shall be available on request.

a) The centre thickness, in millimetres (see 5.3.2.1).

b) The edge thickness, in millimetres, and identification of the measurement point (see 5.3.2.2).

c) The curvature or radius of the unfinished surface.

d) The surface power or tool power (see note 16) or the radius for both surfaces (finished and unfinished).

NOTE 16 The tool power is defined as surface power using a specified refractive index.

e) The optical properties (constringence, spectral transmittance).

f) If different from 6.2, the method of measuring the addition power.

g) The prism thinning, if any.

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

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

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)

Reference method for evaluating progressive addition lens characteristics

A.1 The purpose of this annex is to provide a reference method for specifying certain optical properties of progressive addition lenses. It is not the intent 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 this reference method are also acceptable.

A.2 The characterization can 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 (D_1 and D_2) at any point on the lens.

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

c) It is possible to measure and plot other parameters such as the prism. Future developments may indicate which measures are the most useful.

The reference method for measuring these characteristics should be that using a focimeter which meets the requirements of ISO 8598 and is especially adapted for these measurements (see figure A.1). 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.

δ' should be at least $\pm$ 40° from the fitting point in all directions except for the downward direction which should be $\geqslant$ 45°.

Dimensions in millimetres

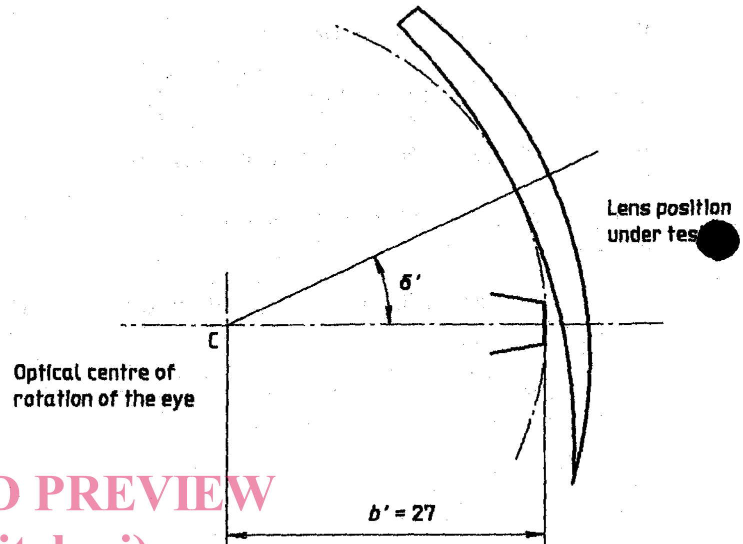


Figure A.1

For these characterizations 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: plano

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.