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Ophthalmic optics — Spectacle frames — Measuring system and vocabulary

Optique ophtalmique — Montures de lunettes — Système de mesure et terminologie

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 7, *Ophthalmic optics and instruments*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 170, *Ophthalmic optics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 8624:2011), which has been technically revised. It also incorporates the Amendment ISO 8624:2011/Amd.1.

The main changes compared to the previous edition are as follows:

— the informative annex with its complementary definitions has been transferred to 3.2;

— minor asymmetry of only the nasal bearing surfaces has been included in this edition. Since such asymmetry does not affect the lens shapes, only the definition of bridge height is affected. See the explanation in 3.2.6, Note 2 to entry.

— the plane of the lens shape has been redefined and now relates to the orientation and position of the vertical centre line, in turn based on the apex of the groove in the frame and not a dummy lens;

— the definition of overall length of side for those without joints has been amended slightly, while the Figures now take account of the 3-dimensional nature of spectacle fronts where there is a significant face form angle;

— an informative annex (Annex A) has been added to discuss measurement of 3-dimensional spectacle frames.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Ophthalmic optics — Spectacle frames — Measuring system and vocabulary

1 Scope

This document specifies a measuring system for spectacle frames and related vocabulary. It is applicable to spectacle frames with fronts that are intended to be symmetrical.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Principal terms of the boxed lens system[1)]

3.1.1
boxed lens system
system of measurement and definitions of spectacle frames based on rectangular boxes that circumscribe the lens shapes and that are used for the determination of the dimensions of the spectacle front and in which the upper tangent is both common to the right and left lens shapes and regarded as being horizontal

Note 1 to entry: In the case of spectacle frames having a significant *face form angle*, the line touching the uppermost edges of the right and left *lens shapes* shall be regarded as horizontal.

Note 2 to entry: For measurement of a lens aperture, the measurements should be taken as if projected onto the base of the rectangular box which is regarded as being tangential to the plane of the lens shape at its boxed centre. This plane is close to that formed by the upper and lower tangents to the *lens shape*. For frame measurements, the aperture is taken to be the size of the hypothetical lens that fits the frame. Measurements to the apex of the groove or equivalent can give slightly different values.

Note 3 to entry: Since the tangent common to the right and left *lens shapes* is regarded as being horizontal, the lines at right angles to it, e.g. the two sides of the box either side of the *lens shape*, are called "vertical". While the frame is worn, the horizontal lines will remain horizontal if the head is held erect, but the vertical lines will frequently not be vertical but, although in a vertical plane, will have their lower ends tipped in towards the cheeks (see the *as-worn pantoscopic angle* in ISO 13666).

1) This clause contains the three most important dimensions for spectacle frames, horizontal boxed lens size, distance between lenses and overall length of side. Tolerances on these are specified in ISO 12870.

3.1.2
boxed centre
C
intersection of the *horizontal centreline* (3.2.1) and *vertical centreline* (3.2.2) of the rectangular box that circumscribes the *lens shape* (3.2.10)

Note 1 to entry: See Figure 1.

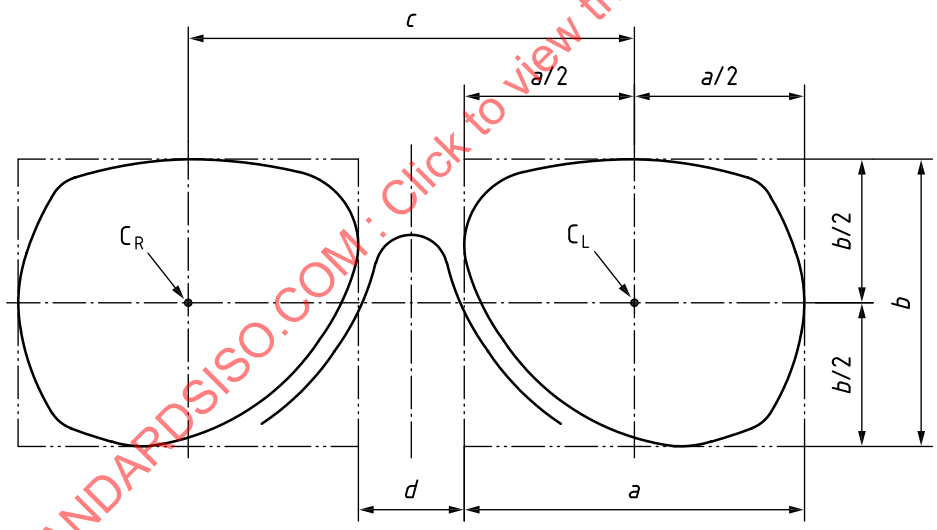
3.1.3
horizontal boxed lens size
horizontal lens size
a
distance between the two vertical sides of the rectangular box that circumscribes the *lens shape* (3.2.10)

Note 1 to entry: For spectacle frames having a significant *face form angle*, the *horizontal boxed lens size* shall be measured in the respective *plane of the lens shape*.

Note 2 to entry: See Figure 1.

3.1.4
vertical boxed lens size
vertical lens size
b
distance between the two horizontal sides of the rectangular box that circumscribes the *lens shape* (3.2.10)

Note 1 to entry: See Figure 1.



Key

C_R, C_L	right, left boxed centre
a	horizontal boxed lens size
b	vertical boxed lens size
c	boxed centre distance
d	distance between lenses

Figure 1 — Measurements related to spectacle frames — Spectacle fronts

3.1.5
boxed centre distance
c
horizontal distance between the *boxed centres* (3.1.2)

Note 1 to entry: See Figure 1.

Note 2 to entry: For spectacle frames having a significant *face form angle*, the *boxed centre distance* shall be measured between the *vertical centrelines* passing through the groove of the frame aperture. See Figure 4.

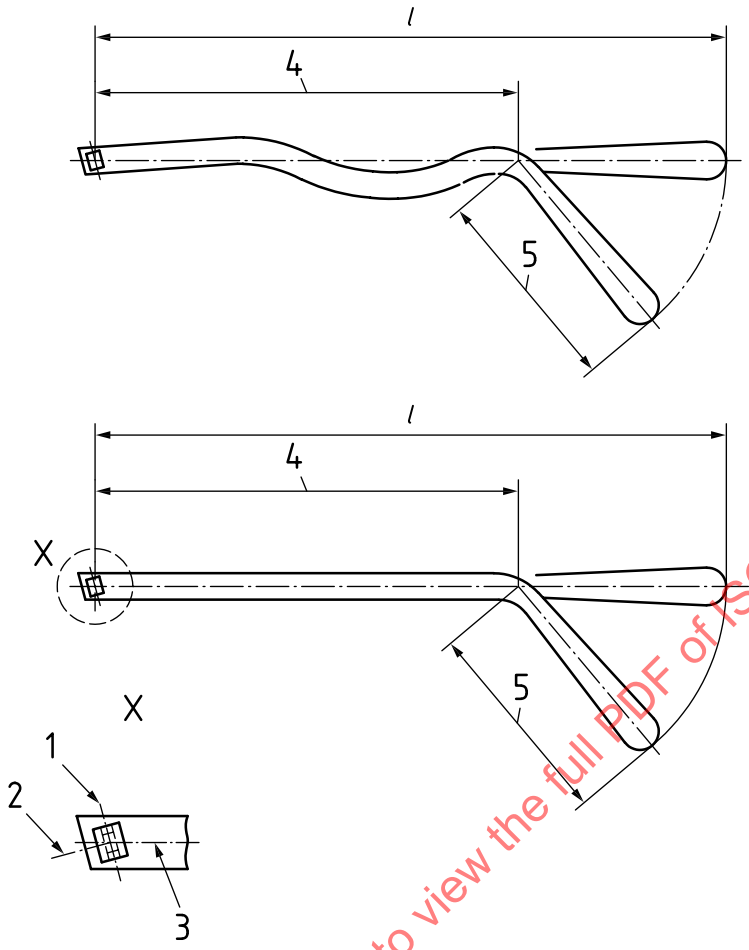
3.1.6
distance between lenses
d
horizontal distance between the nasal vertical sides of the rectangular boxes that circumscribe the right and left *lens shapes* (3.2.10)

Note 1 to entry: See Figure 1.

3.1.7
overall length of side
l
length from the intersection of the dowel screw's axis with the median plane of the joint to the end of the side and parallel to the centreline of it, the drop having been straightened

Note 1 to entry: See Figure 2.

Note 2 to entry: For sides without a joint, the side should be held open at $(90\ ^{0}_{-5})°$ to the front or to that part of the side (the lug) that is intended to be attached to the front, and the length measurement is from the end of the side to the back surface of the lug less 10 mm. See Figure 3.

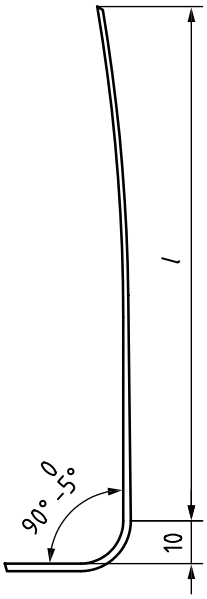


Key

1 axis of joint or dowel screw axis
2 median plane of joint
3 centreline of side
4 length to bend (see 3.2.7)
5 length of drop (see 3.2.8)
l overall length of side (*l* = dimensions 4 + 5)
X detail of the measurement position at the intersection of the three lines at the joint

Figure 2 — Measurements related to spectacle frames — Spectacle sides

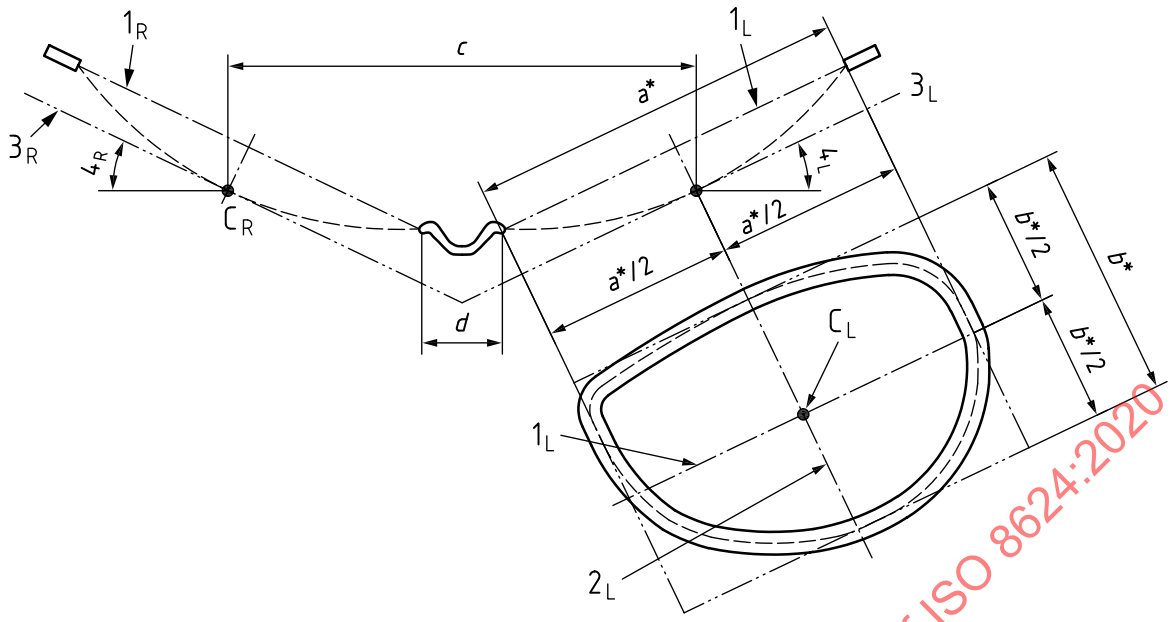
Dimension in millimetres



Key

l overall length of side

Figure 3 — Measurement of overall length of side for sides without a joint



Key

C_R, C_L	right, left boxed centre
*a**	horizontal boxed lens size
*b**	vertical boxed lens size
c	boxed centre distance
d	distance between lenses
1_R, 1_L	right, left horizontal centreline
2_L	left vertical centreline
3_R, 3_L	right, left plane of the lens shape
4_R, 4_L	right, left face form angle

NOTE In this Figure, *a** and *b** are the size measured to the apex of the groove.

Figure 4 — Measurement of boxed centre distance in frame having significant face form angle
(the dashed lines represent the apex of the groove in the spectacle frame)

3.2 Complementary terms of the boxed lens system

3.2.1
horizontal centreline
horizontal straight line located at an equal distance from the two horizontal tangents of the *boxed lens system* (3.1.1)

Note 1 to entry: The *horizontal centreline* is based on the apex of the groove or equivalent.

Note 2 to entry: For rimless and semi-rimless frames, the centre of the edge of an afocal lens mounted in the frame is to be regarded as equivalent.

Note 3 to entry: See Figures 4, 5 and 6.

3.2.2
vertical centreline
vertical straight line located at an equal distance from the vertical sides of the rectangular box that circumscribes the *lens shape* (3.2.10)

Note 1 to entry: The *vertical centreline* is based on the apex of the groove or equivalent.

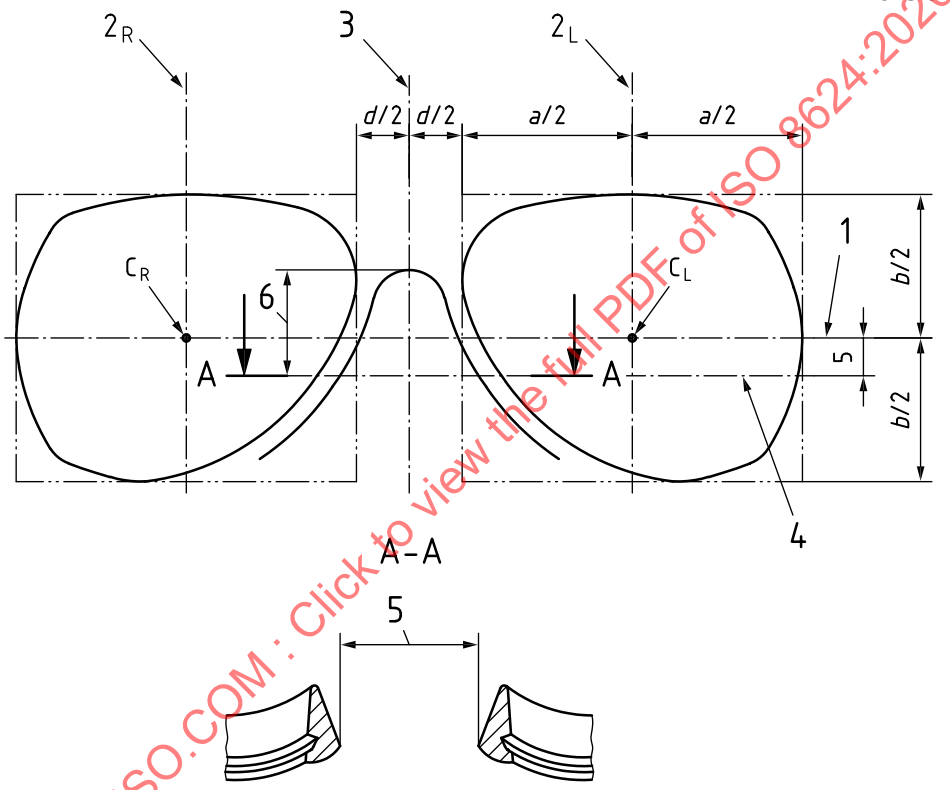
Note 2 to entry: For rimless and semi-rimless frames, the centre of the edge of an afocal lens mounted in the frame is to be regarded as equivalent.

Note 3 to entry: See Figures 4 and 5.

3.2.3
vertical axis of symmetry
vertical symmetry axis
vertical straight line located at an equal distance from the nasal vertical sides of the rectangular boxes that circumscribe the right and left *lens shapes* (3.2.10)

Note 1 to entry: See Figure 5.

Dimension in millimetres



Key

C_R, C_L	right, left boxed centre
a	horizontal boxed lens size
b	vertical boxed lens size
d	distance between lenses
1	horizontal centreline
2_R, 2_L	right, left vertical centreline
3	vertical axis of symmetry
4	bridge width line
5	bridge width
6	bridge height

Figure 5 — Complementary terms relating to fronts

3.2.4
bridge width line
horizontal reference line for bridge measurements positioned 5 mm below the *horizontal centreline* (3.2.1)

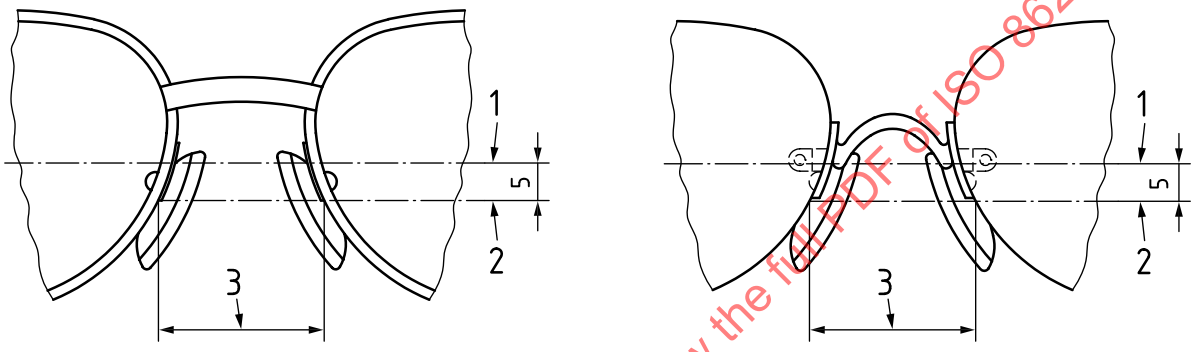
Note 1 to entry: See Figures 5 and 6.

3.2.5
bridge width
minimum distance between the rims measured along the *bridge width line* (3.2.4)

Note 1 to entry: For spectacle frames with adjustable pads, *bridge width* applies to the rims, not the pads; for rimless spectacles, it applies to the minimum distance between the nasal edges of the spectacle lenses measured along the *bridge width line*.

Note 2 to entry: See Figures 5 and 6.

Dimension in millimetres



a) Spectacle frames with metal pad bridges **b) Rimless spectacle frames**

Key
1 horizontal centreline
2 bridge width line
3 bridge width

Figure 6 — Measurement of bridge width

3.2.6
bridge height
distance from the *bridge width line* (3.2.4) to the lower edge of the bridge, measured along the *vertical symmetry axis* (3.2.3)

Note 1 to entry: See Figure 5.

Note 2 to entry: When a frame, probably custom-made or modified, has asymmetrical nasal bearing surfaces but not *lens shapes*, the bridge height is measured from the *bridge width line* to the highest point on the lower edge of the bridge, whether or not this point lies on the *vertical symmetry axis.*

3.2.7
length to bend
length from the intersection of the dowel screw's axis with the median plane of the joint to the intersection point of the axis of the tip and side, measured along the axis of the side

Note 1 to entry: See Figure 2.

3.2.8
length of drop
length from the intersection point of the axes of the side and tip to the end of the side

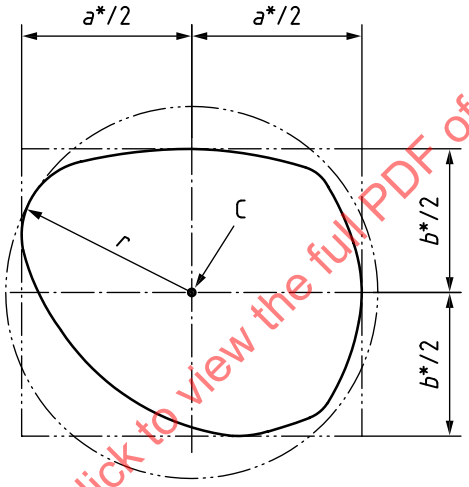
Note 1 to entry: See Figure 2.

3.2.9
frame effective diameter
twice the longest distance from the *boxed centre* (3.1.2) to the apex of the frame groove in millimetres

Note 1 to entry: This is the size of the smallest circular uncut lens that can be edged to the *lens shape* (3.2.10) with its geometrical centre positioned at the *boxed centre* (3.1.2).

Note 2 to entry: If the frame is either semi-rimless or three-piece mount, the endpoint of the radius is taken using the lens edge.

Note 3 to entry: See Figure 7.



Key

C boxed centre
a^* horizontal boxed lens size
b^* vertical boxed lens size
r distance from the boxed centre to the point on the lens edge furthest from the boxed centre

NOTE In this Figure, a^* and b^* are the size measured to the apex of the groove.

Figure 7 — Circle showing the outline of an uncut lens having the effective diameter

3.2.10
lens shape
outline of the lens periphery with the nasal side and the horizontal indicated

Note 1 to entry: "Lens shape" refers to the shape of the hypothetical lenses that fit the frame with:

— for a lens having a bevelled edge, the outermost edge of the lens, the lens having a bevel or edge profile corresponding to the manufacturer's design or the bevel angle or the edge profile that fits the specific groove, and a bevel width greater than the width of the groove in the front;

— for a lens having a flat or grooved edge, the outermost edge of the lens.

3.2.11
plane of the spectacle front
plane containing the *vertical centrelines* (3.2.2) of the right and left *lens shapes* (3.2.10)

Note 1 to entry: This will be an approximation if the two centrelines are not parallel to each other.

Note 2 to entry: See Figure 8.

3.2.12
plane of the lens shape
plane containing the *vertical centreline* (3.2.2) and is parallel to the *horizontal centreline* (3.2.1) of the individual lens

Note 1 to entry: For this purpose, the *vertical centreline* (3.2.2) and the *horizontal centreline* (3.2.1) are based on the apex of the groove. For rimless and semi-rimless frames, the centre of the edge of an afocal lens mounted in the frame is to be regarded as equivalent.

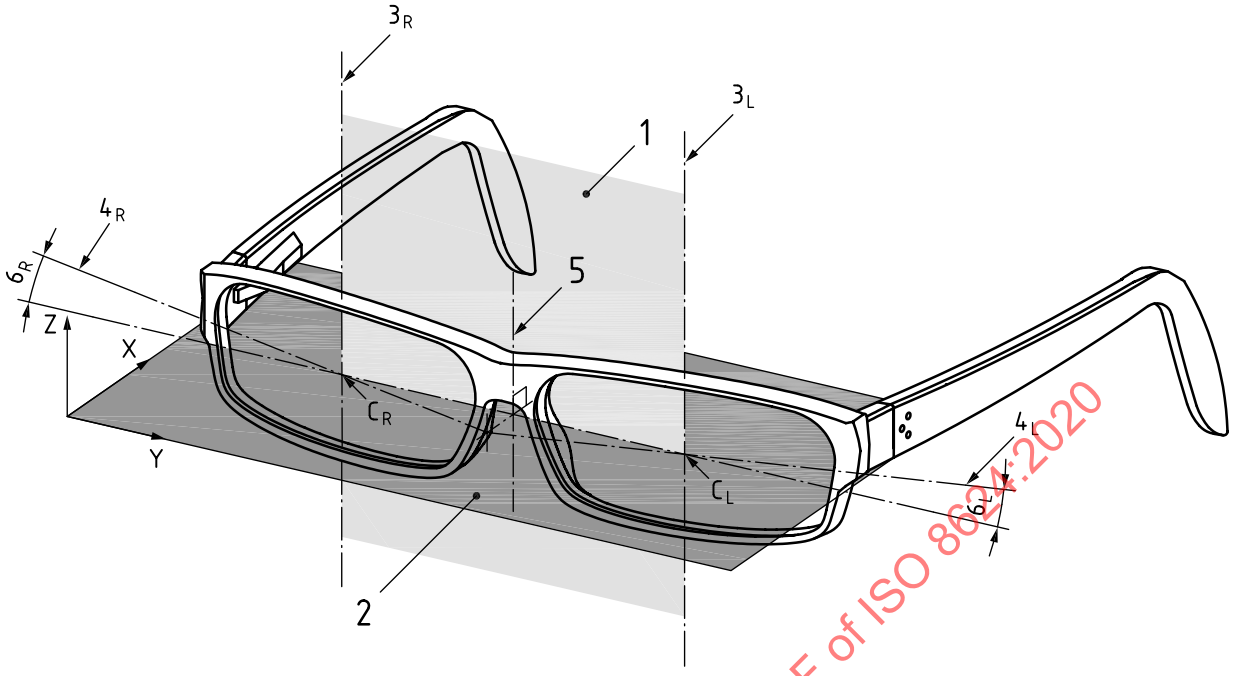
Note 2 to entry: See Figure A.1.

3.2.13
face form angle
wrap angle
angle between the *plane of the spectacle front* (3.2.11) and the right *plane of the lens shape* (3.2.12), or of the left *plane of the lens shape* (3.2.12)

Note 1 to entry: The right or left *face form angle* is regarded as positive if the temporal side of the *plane of the lens shape* is posterior to the nasal side.

Note 2 to entry: The *face form angles* are often measured and specified as the average of the right and left angles, but the frame can be adjusted for a specific wearer so that they differ, and the right and left angles should then be specified.

Note 3 to entry: See 6_R and 6_L in Figure 8.



Key

C_R, C_L	right, left boxed centre
1	plane of the spectacle front
2	XY plane, perpendicular to plane 1
3_R, 3_L	right, left vertical centreline
4_R, 4_L	right, left horizontal centreline
5	vertical axis of symmetry
6_R, 6_L	right, left face form angle, measured in plane 2

Figure 8 — 3-dimensional schematic representation of the plane of the spectacle front and the face form angles

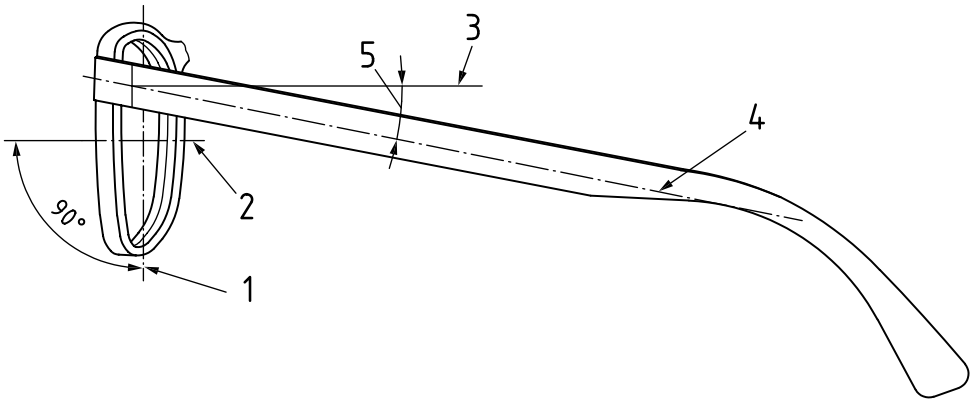
3.2.14
side angle, en GB
angle of side, en GB
frame pantoscopic angle, en US
angle in the vertical plane, when the side is opened, between the perpendicular to the *plane of the spectacle front* (3.2.11) and the line joining the middle of the joint to the point on the lower edge of the side that is assumed to make contact with the top of the ear

Note 1 to entry: When the spectacle frame is of semi-rimless or rimless construction, the reference line should be taken as the line joining the rear surface of the upper and lower edges of a plano or demonstration or dummy lens along the vertical centreline.

Note 2 to entry: Unless otherwise stated, the side angle is regarded as positive if downwards from the perpendicular to the reference line.

Note 3 to entry: In dispensing, the reference line is to the back surface of the rims, but in frame design, it is to the apex of the groove or equivalent. There can be a difference between the two resulting angles of up to 1,5°.

Note 4 to entry: See Figure 9.



Key

1 reference line touching the rear surface of the rims along the vertical centre line
2 perpendicular (orthogonal) to the reference line
3 line through the middle of the joint parallel to line 2
4 line joining the middle of the joint to the point on the lower edge of the side that is assumed to make contact with the top of the ear
5 side angle (positive in this example)

Figure 9 — Illustration of the measurement of side angle when dispensing

4 Measuring system

The measuring system for spectacle frames shall be in accordance with Figures 1 to 4, as defined in 3.1.

If codes are used in spectacle frame documentation, the symbols given for the terms defined in 3.1 shall be employed.

3.2 defines complementary terms relating to the boxed lens system. These are useful in the derivation of the principal terms and when dispensing spectacles but are not used when describing the size of a manufactured frame.

The measuring system comprises several horizontal and vertical dimensions and reference points. The knowledge of these is necessary for the manufacturing, ordering and adjustment of spectacle frames as well as for the exact mounting of spectacle lenses into spectacle frames.

Annex A, which is informative, discusses the implications of measurement of 3-dimensionally shaped frames, particularly on some of the Figures in this document.

Annex A
(informative)

Measurement of 3-dimensionally shaped spectacle frames

This document was originally drafted when frames were relatively flat with zero or very small face form angles. The use of spectacle frames with significant *face form angles* means that measurements made in the *plane of the spectacle front*, as will be seen by an observer looking at the frame on a wearer, can differ from those measurements of lens dimensions made in the *plane of the lens shape*.

NOTE A difference in measurement of around 0,25 mm occurs when a monocular centration distance of 34 mm is measured in the *plane of the spectacle front* or the *plane of the lens shape* when the *face form angle* is around 7°. The same error will occur for a *horizontal lens size* of 54 mm with an angle of 5,5°. Frames requiring base curves of 8 D or over are also likely to require measurement of lens dimensions in the *plane of the lens shape.*

Figure A.1 gives an overall view in 3D of the spectacle front. Figures 4, A.2 and A.3 show measurement of distance between lenses and boxed lens sizes.