

Australian Standard[®]

Spectacles

Part 1: Spectacle lenses

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Part 1: Spectacle lenses

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PREFACE

This Standard was prepared by the Standards Australia Committee on Ophthalmic Optics as a complete revision of AS 2228—1978, *Spectacle lenses*.

This Standard is now divided into two parts. Part 1 gives separate consideration to semi-finished lens blanks, finished stock lenses and surfaced, edged and mounted lenses, and separate optical and geometrical tolerances for each type are given.

Part 2 contains the basic requirements for unglazed spectacle frames, and includes performance requirements, testing requirements, a method of frame measurement and specifications for frame marking.

During the preparation of this Standard, the following documents were referred to:

BS

2738 Tolerances on optical properties of mounted spectacle lenses

3062 Ophthalmic lens materials

3521 Glossary of terms relating to ophthalmic lenses and spectacle frames
Part 1: Glossary relating to ophthalmic lenses

ISO

8980 Ophthalmic optics—Finished single-vision corrective lenses

8980-1 Part 1: General requirements

10322 Ophthalmic optics; Semi-finished lens blanks

10322-1 Part 1: Specifications for single vision and multifocal lens blanks

10322-2 Part 2: Specifications for progressive power lens blanks

ASTM

D 3359 Standard methods for measuring adhesion by tape test

Acknowledgment is made of the assistance received from these sources.

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STANDARDS AUSTRALIA

Australian Standard Spectacles

Part 1: Spectacle lenses

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies requirements for all types of ophthalmic lenses for spectacles, both before and after laboratory processing and mounting into frames.

Finished spectacles, commonly known as ‘ready made’ or ‘magnifying’ spectacles which are sold over the counter without a prescription are covered by this Standard, even though the use of such spectacles is strongly discouraged.

NOTES:

- 1 Requirements for spectacle frames are given in AS 2228.2.
- 2 This Standard does not apply to non-prescription sunglasses (which are covered by AS 1067, Parts 1 and 2), non-prescription protective eyewear (which are covered by AS 1337) or to contact lenses (which are covered by AS 1887) or intra-ocular lenses.

1.2 APPLICATION Lenses shall comply with the requirements of the following Sections as applicable, depending upon their type and stage of processing:

- (a) Semi-finished lens blanks: Section 2.
- (b) Finished uncut lenses: Section 3.
- (c) Edged lenses and mounted lenses: Section 4.
- (d) Special requirements for lenses: Section 5.

1.3 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1067	Sunglasses and fashion spectacles
1067.1	Part 1: Safety requirements
1067.2	Part 2: Performance requirements
1336	Recommended practices for eye protection in the industrial environment
1337	Eye protectors for industrial applications
1887	Contact lenses
2228	Spectacles
2228.2	Part 2: Spectacle frames

1.4 DEFINITIONS For the purposes of this Standard, the definitions below apply.

1.4.1 Addition power—the difference in a multifocal or progressive power lens between the powers of the distance portion and the near portion. Often thought of as the power of a converging spherical lens which is superimposed on a distance prescription to provide clear vision at a near viewing distance.

Appendix A describes the method of measurement of addition power.

1.4.2 Aspheric surface—literally means non-spherical surface, but its use in ophthalmic optics is usually restricted to surfaces having non-circular sections in all meridians. It does not include toric surfaces, but does include all surfaces of revolution other than spheres and includes the variable surface of progressive lenses.

1.4.3 Astigmatic lens—a lens which forms two separate line foci at right angles. One of these focal lines may be at infinity. Astigmatic lenses are sometimes referred to as toric, compound, cylindrical or spherocylindrical.

1.4.4 Astigmatic power—the difference between the powers of an astigmatic lens in the two principal meridians.

1.4.5 Back surface—the surface of a spectacle lens closer to the eye.

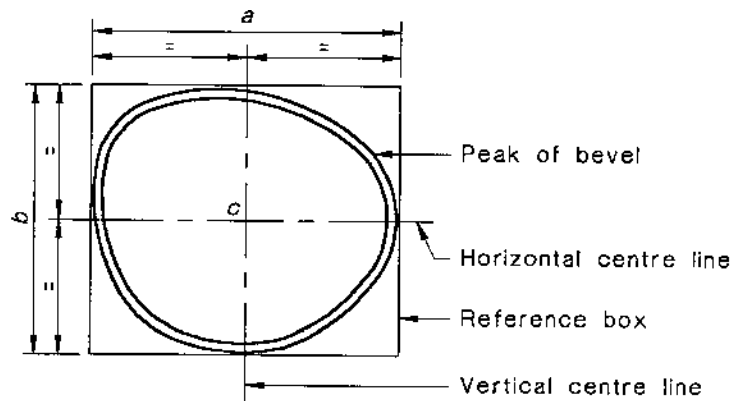
1.4.6 Back vertex—the point at which the optical axis intersects the back surface.

1.4.7 Back vertex power—the reciprocal of the distance from the back vertex of a lens in air to the paraxial focus for parallel light incident on the front surface. The SI unit for power is the reciprocal metre (m^{-1}), commonly referred to as the dioptre. The symbol D is often used for lens power and is used in this document to mean m^{-1} . Since lens power varies with wavelength it is normally specified for the helium d-line at 587.6 nm or the mercury e-line at 546.1 nm.

1.4.8 Base curve—for semi-finished lens blanks the base curve is the power of the finished surface. The manufacturer usually specifies only a nominal base curve which is chosen from various processing considerations, and this may differ from the true or actual base curve which is needed for optical calculations by 0.50 D or more. For astigmatic surfaces the base curve is the power in the flattest meridian.

1.4.9 Boxed centre (geometrical centre, mechanical centre)—the intersection of the horizontal and vertical centre-lines of the reference box which circumscribes the lens (see Figure 1.1).

1.4.10 Carrier curve—a discrete region around the periphery of a lens surface which has a lower surface power than the central region. This is included to reduce lens thickness or to simplify lens processing.



LEGEND:

- a = horizontal lens size
- b = vertical lens size
- c = boxed centre

FIGURE 1.1 REFERENCE BOX SYSTEM FOR LENSES

1.4.11 Distance reference point—that point on a lens or lens blank at which the manufacturer designates that the design specifications for the distance portion shall apply. For an uncut non-prismatic single vision or multifocal lens or lens blank it is assumed to be the geometric centre unless otherwise stated. For an edged non-prismatic single vision or multifocal lens it is located at the optical centre. For a single vision lens it may be used as a reference point regardless of whether the lens is to be used for distance or near vision. For a progressive lens or lens blank it is that point at which the manufacturer designates that the design specification for the refractive power of the distance portion shall apply.

1.4.12 Distance visual point—the point at which the line of sight intersects a lens when viewing a distant object.

1.4.13 Dividing line—the edge of a multifocal lens segment across which the wearer's line of sight passes in moving from distance to near vision.

1.4.14 Edged lens—a lens which has been cut or ground to the size and shape required for fitting to a spectacle frame.

1.4.15 Finished stock lens—a lens of single vision, multifocal or progressive type for which both front and back optical surfaces are factory finished, and which is intended to be held in stock prior to cutting or edging to the final size and shape and fitting into a spectacle frame.

1.4.16 Front vertex power—the reciprocal of the distance from the front vertex of a lens in air to the paraxial focus for parallel light incident on the back surface.

1.4.17 Horizontal centre-line—the line midway between and parallel with the horizontal lines of the reference box which circumscribes the lens (see Figure 1.1).

1.4.18 Horizontal lens size—the distance between the vertical sides of the reference box which circumscribes the lens (see Figure 1.1).

1.4.19 Mounted lens—a lens which has been cut or edged to size and shape and fitted to a spectacle frame.

1.4.20 Multifocal lens—a lens designed to provide correction for two or more discrete viewing distances. It may have one segment (bifocal), two segments (trifocal) or more segments, and the segments may be clearly delineated or blended into the lens. The term 'multifocal lens' does not include progressive lenses.

1.4.21 Near reference point—that point on a lens or lens blank at which the manufacturer designates that the design specifications for the near portion shall apply. For a multifocal lens or lens blank this often coincides with the geometric centre of the segment.

1.4.22 Near visual point—the point at which the line of sight intersects a lens when viewing a near object.

1.4.23 Optical axis—the line passing through the centre of curvature of each surface of a lens. For the segment of a multifocal lens, it is the line passing through the centre of curvature of the segment and the centre of curvature of the opposite surface of the lens.

1.4.24 Optical centre—the point at which the optical axis passes through the thin lens approximation to the real lens.

1.4.25 Power—the ability of an optical surface or a lens to converge or diverge light. For an ophthalmic lens, power usually refers to back vertex power. The power of a lens is the reciprocal of the focal length of a lens. Also known as refractive power.

1.4.26 Progressive power lens—a lens designed to provide correction for more than one viewing distance and in which the power changes continuously rather than in discrete steps.

1.4.27 Principal meridians—the two sections of an astigmatic lens which contain the maximum and minimum lens powers and the optical axis. They are usually perpendicular to each other.

1.4.28 Prismatic power—the deviation of a light ray through a specified point on a lens, measured in centimetres of deviation per metre of distance from the lens and commonly referred to as 'prism'. The unit is usually called the prism dioptre.

1.4.29 Reference box—the rectangle formed by the horizontal lines at the vertical extremes of the lens and the vertical lines at the horizontal extremes of the lens (see Figure 1.1).

1.4.30 Reference points of a progressive lens (see Figure 1.2)

1.4.30.1 Prism reference point (A)—the point at which prism is measured, and which is the optical centre in a non-prismatic lens.

1.4.30.2 Fitting reference point (B)—the point used to position the lens in relation to the patient's pupil. It is usually marked as a cross.

1.4.30.3 Distance reference point (C)—see Clause 1.4.11. It is usually at the centre of a marked distance reference circle.

1.4.30.4 Near reference point (D)—see Clause 1.4.21. It is usually at the centre of a marked near reference circle.

Further markings indicate the 0-180° axis of the lens.

1.4.31 Refractive power—see Power.

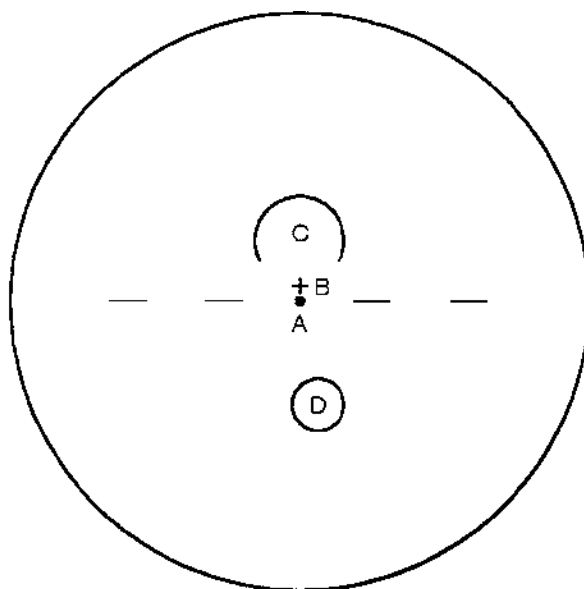


FIGURE 1.2 REFERENCE POINTS AND TYPICAL MARKINGS FOR A PROGRESSIVE LENS

1.4.32 Seg inset—the horizontal decentration of the vertical bisection of the segment from the distance reference point.

1.4.33 Segment—that part of a multifocal lens, commonly known as ‘seg’, which is designed to provide viewing at a different distance to the main part of the lens. The segment usually provides clear vision at a closer distance than the main part of the lens.

1.4.34 Semi-finished lens blank—a lens blank of single vision, multifocal or progressive type in which only one surface is optically finished and the other surface must be further processed to produce a finished lens.

1.4.35 Single vision lens—a lens with the same nominal refractive power at all points.

1.4.36 Spherical power lens—a lens which causes parallel rays of light to converge to, or diverge from, a focal point.

1.4.37 Surface power—the ability of a lens optical surface to cause incident parallel light to converge or diverge, defined as the ratio of the difference between the refractive indices on either side of the surface and the radius of curvature of the surface. A surface which converges incident parallel light has positive power, and a surface which diverges incident parallel light has negative power.

1.4.38 Surfaced lens—a lens which is processed from a lens blank by machining and polishing one or both optical surfaces.

1.4.39 Uncut lens—a lens which has optically finished surfaces but which has not been cut or edged to the final size and shape for mounting in a spectacle frame. An uncut lens may be a finished stock lens or a surfaced lens.

1.4.40 Vertical centre line—the line midway between and parallel with the vertical lines of the reference box.

1.4.41 Vertical lens size—the distance between the horizontal sides of the reference box which circumscribes the lens (see Figure 1.1).