Contact Lens Parameters

Overview:

It is important to establish that a specific lens manufacturing process can produce lenses to required parameters. This is important for both lathe cut lenses and also cast moulded lenses. A range of measurement methods can be used to determine various characteristics of the lens and these include radius of curvature and back vertex power. The contact lens properties are measured using the methods described in the following standard.

ISO 18369-3:2006 Ophthalmic Optics – Contact lenses – Part 3: Measurement methods.

On completion of a sufficient amount of testing, the ability to produce finished lenses to an acceptable standard can be established by reference to ISO 18369-4:2006 Ophthalmic Optics – Contact lenses – Part 2: Tolerances.

The following table details the lens parameters and the methods used for their determination

Parameter	Method	Lens Type
Radius of curvature	Optical microspherometry	Rigid
	Sagittal depth	Hydrogel
Back vertex power	Focimeter	Rigid & Hydrogel
Lens diameter	Projection method	Rigid & Hydrogel
Lens thickness	Dial gauge	Rigid & Hydrogel

Procedures:

- *Radius of Curvature - Optical Microspherometry*

The microspherometer locates the surface vertex and aerial image (centre of curvature) with the Drysdale principle. The optical microspherometer consists essentially of a microscope fitted with a vertical illuminator. Light from the target T is reflected down the microscope tube by a semi-silvered mirror and passes through the microscope objective to form an image of the target at T'. This is referred to as the surface image. The distance between the microscope and the lens surface is then increased, by either raising the microscope or lowering the lens on the microscope stage until another sharp image is observed. This is the aerial image. The distance through which the sample has been moved relative to the surface image is equal to the radius of curvature of the surface. The distance of travel is measured with an analogue distance gauge incorporated in the instrument.

- *Radius of Curvature - Sagittal Depth*

Sagittal depth is the distance from the vertex of the contact lens surface to a chord drawn across the surface at a known diameter. For the determination of the sagittal depth of the back optic zone, the contact lens is rested concave side down against a circular contact lens support of fixed outside diameter. The spherometer projects the profiles of the contact lens, lens support and probe onto a screen. The projection system has a magnification of at least 10x and enables the lens, lens support and probe to be focused together. The operator ensures that the contact lens is centered on the support so that the probe approaches along the lens axis, and finally just touches the back vertex of the lens. This is the endpoint required to obtain a measurement value. The distance traveled by a solid mechanical probe from the plane of the lens support to the lens back surface vertex is the sagittal depth.

- *Back Vertex Power*

The back vertex power of both soft and rigid contact lenses can be determined in air by the use of a focimeter. The focimeter is modified with a contact lens support so that the contact lens rests on a supporting ring. The lenses are equilibrated prior to measurement and the focimeter and support are kept at 20°C. The contact lens is placed with its posterior surface against the contact lens support to properly position the back vertex as the reference point for measurement. It is important that the back vertex be centered in the pupil of the lens stop and the lens surface be free of debris or solution. Therefore any surface liquid should be removed, particularly for hydrogel lenses immediately prior to measurement.

- *Lens Diameter*

The diameter of both rigid and soft hydrogel contact lenses is measured using the projection comparator method. The projection system is capable of measuring to ±0.05mm over a range of 0mm to 17mm. The scale of the screen represents a linear magnification of at least x15 and permits measurement accuracy of 0.05mm for the contact lens diameter. The diameter of the lens is taken from a marked glass scale (similar to a microscope graticule) under the lens within the support, which is projected onto the screen. Hydrogel lenses are equilibrated at a temperature of 20°C ± 0.5°C and the projection comparator is also maintained at a temperature of 20°C. The contact lens is placed on the support which is then filled with saline which is also maintained at 20°C ± 0.5°C.

- Lens Thickness

Thickness, measured through the section of a contact lens is made using a dial gauge for both rigid and soft contact lenses.

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