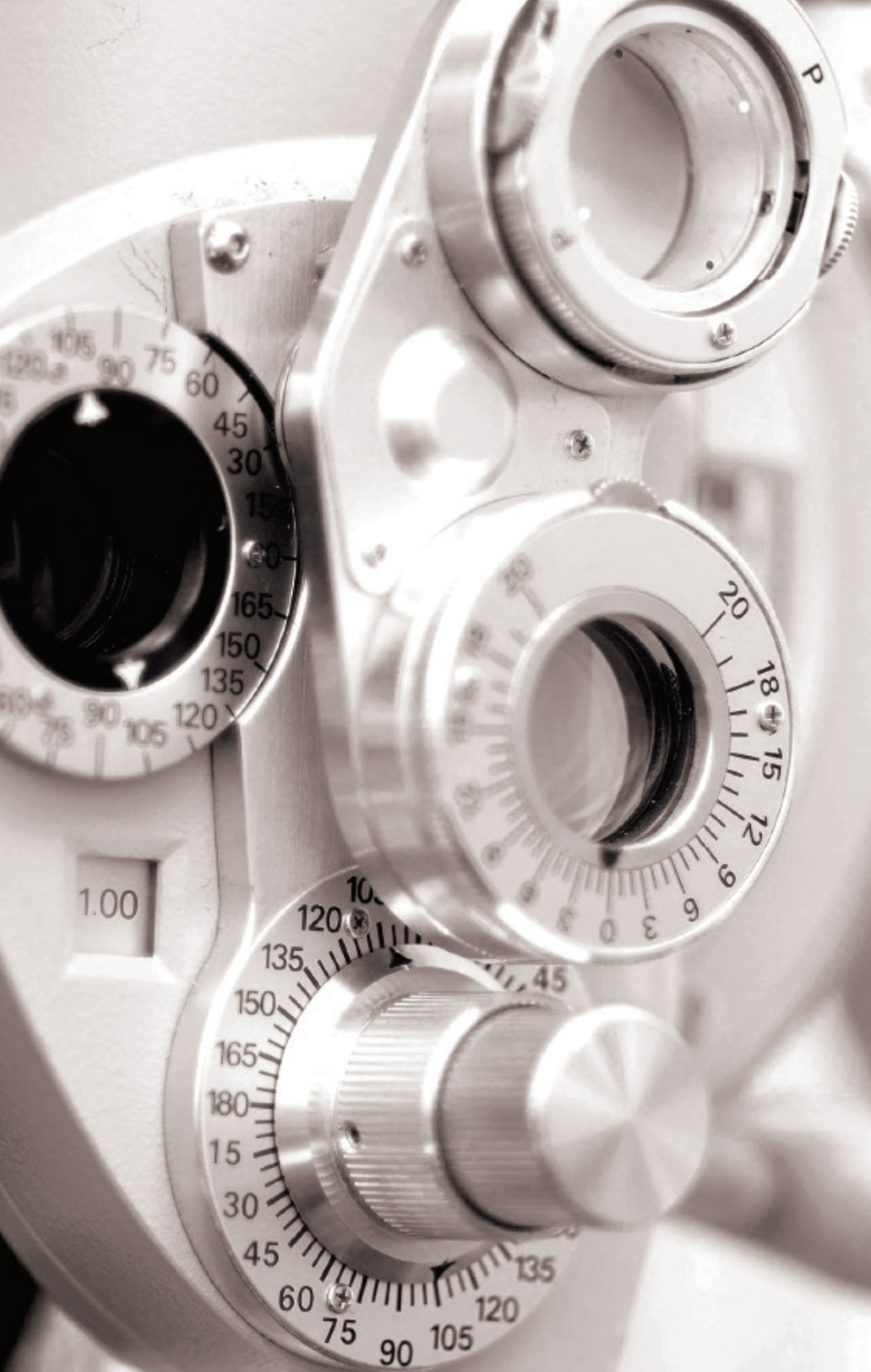

Gelflex

Australian contact lenses

PROFESSIONAL FITTING GUIDE

GAS PERMEABLE SCLERAL LENSES

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RECOMMENDED READING

1. Bier and Lowther. Contact Lenses. Chapter 8. "Preformed Scleral Lenses"
2. Phillips and Stone. Contact Lenses. Chapter 10. "Preformed Scleral Lenses" by E.G. Woodwood.
3. Herman Treissman. The Contact Lens Journal. "A Personal Technique of Scleral Lens Fitting".

INTRODUCTION

There are two methods of fitting Scleral lenses.

1. *Moulding Technique*
   With this method a mould is taken of the eye. The resultant mould is then cast and the impression of the eye so obtained is then used to press out from material a scleral lens.
2. *Preformed Technique*
   There are two types of Preformed lenses.
   a. *Shell Type* - In this method, an extra shell is made of each eye moulded. These lens "types" are then filed depending on the scleral shapes, steep, medium or flat. The patients sclera is evaluated and the "type" shell is then used to match the sclera.
   b. *Lathe Turned* - In this method, the details of the required corneal and scleral curves are evaluated and the lens lathe turned from a blank of material.

The heating and moulding of gas permeable materials is difficult and attempts to make scleral lenses in this way have not been successful.

As the Gas Permeable Scleral material has to be lathe turned, the moulding technique and the Cast Type method cannot be used. All the Gas Permeable Scleral Lens patients we have fitted have been fitted with lathe turned lenses. This is the system that is described.

PREFORMED SCLERAL LENSES

In comparison with the impression technique, preformed lenses have certain advantages. Precise specifications can always be recorded, transmitted to the manufacturer for fabrication or subsequent reproduction without storing and submitting eye models. They can be precisely measured and checked by both laboratory and practitioner alike.

A preformed lens can be used to give the patient the experience of having a lens on the eye prior to fitting and to over-refract on determination of the required optical prescription. They have definite advantages in cases where impression-taking is difficult or contra-indicated. A preformed lens can be manufactured from a solid button of plastic and thus made somewhat thinner and with greater precision. Modifications are generally simpler and easier to specify since spherical scleral and transition curves are frequently employed whereas with impression lenses the surface may be irregular.

The necessary and desirable features in minimum-clearance scleral contact lenses are:

1. The scleral portion of the lens to be of curved construction, evenly balanced and distributed.
2. For cosmetic reasons , the overall lens diameter must be large enough to cover at least the palpebral aperture without restriction of eye movements, especially the nasal portion of the lens extending to the inner canthus. Too wide a flange can give nasal limbus touch.
3. The overall diameter to be variable in size and is determined by the practitioner.
4. Adequate variation of radii and measurements in both optic and scleral portion of the lens.
5. Specified scleral and optic thickness to be accurately dispensed. An average of 0.60mm - 0.70mm should be maintained for the scleral rim, leaving sufficient allowance for any local modifications and settling if indicated. Minimum optic thickness is desirable, consistent with power and front transition.
6. An entirely smooth and blended front transition with specification of front optic diameter, if desired.
7. The back transition to be ground or formed according to specification.
8. The corneal measurements of the full range to comply exactly with the specifications submitted.
9. Any optical prescription to be incorporated.
10. The finish of surfaces and edges to be highly polished.

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FITTING PROCEDURE
The initial routine with preformed scleral lenses can be divided into two sections with most fitting designs;

1. Scleral fitting.
2. Cornea-limbal fitting.

The Scleral and the Corneal measurements are done separately.

THE SCLERAL FIT
The radius and diameter of the scleral portion should be chosen to give as even and large a bearing zone over the sclera as possible. The overall size of the lens should be great enough, but not so large that the nasal flange rides against the caruncle forcing the lens to move temporally when the patient looks in the nasal direction, with resultant nasal corneal touch. The scleral should also not be so wide that it rests against the lower cul-de-sac causing vertical displacement or discomfort on down gaze. Overall diameter of 23.00mm is most common but larger or smaller sizes can be used as the case demands.

Diagnostic lenses used to evaluate the scleral fit have the central portion parameters designed so that the measuring lens fully clears the cornea. If the lens rests on the corneal apex it will be held away from the sclera and the scleral measurement cannot be truly evaluated.

To ensure full corneal clearance with the lens, a central steep optic radius is required, usually 8.00mm, with a BCOD of 13.00mm or 13.50mm With the Scleral Fitting lens set three lenses with the following scleral radii are used.

Standard overall size is 24.00mm with Scleral radii of 13.50mm, 13.75mm and 14.00mm

The largest lens is the preferred lens size. Smaller lenses have to be fitted for babies to allow parents to easily manage lens handling.

SCLERAL PORTION
MOST COMMON LENSES FIT

Babies:

Radius (mm)	14.00
Diameters (mm)	14.00

Aged 4 to 8 years:

Radius (mm)	14.00
Diameters (mm)	18.00

Adults:

Radius (mm)	14.00
Diameters (mm)	23.00

SCLERAL FIT EVALUATION
The fit of the scleral can be evaluated using white light. With white light any areas of excessive bearing will cause the blood to be forced from the conjunctival vessels causing this region to appear whiter than the surrounding conjunctiva. This is termed blanching. Tight or harsh bearing areas can be accentuated by applying light pressure to the anterior surface of the lens with the finger. If the scleral radius is too flat the area of blanching will correspond to the junction between the scleral radius and transition. By placing diagnostic lenses on the eye with different scleral radii the lens which results in no blanching gives the proper radius.

GELFLEX SCLERAL DIAGNOSTIC SET
Scleral Diagnostic Set (3 lenses)

13.50mm Scleral radius
13.75mm Scleral radius
14.00mm Scleral radius

Overall lens diameter: 24.00mm
Scleral Radii Engraved: 13.50, 13.75, 14.00
Power: Plano
Central Fenestration Material: PMMA

All diagnostic lenses are manufactured with no blending on the back surface.

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THE CORNEAL FIT

The cornea and limbus must be fully cleared to achieve a fit which will be comfortable and can be tolerated for long periods without upsetting corneal physiology. Success of toleration lies in the control and then maintenance of minimum
corneal clearance of no less than 5-7/100 mm and no more than 10-12/100 mm.

To achieve this with fenestrated lenses is more difficult than with fluid lenses. Ventilated contact lenses settle much further on to the eye than do the liquid form of lenses. If commencing with full corneal clearance in the first instance and the lenses are worn daily and regularly, this "settling effect" may extend over an initial period of up to one month before full and final bedding-down takes place.

There is no apparent reason, other than thickness and compressibility of conjunctiva and episcleral tissue why such a comparatively long period may be required.

THE CORNEAL LENS FITTING

Fenestrated Lenses for Optical Measurement (FLOM)

In order to attain the correct corneal fit, the practitioner is advised to employ the specially designed range of FLOM diagnostic lenses. Diagnostic lenses such as these give a precise measurement of the relationship between the cornea and the back surface of the lens.

A FLOM lens comprises an optic portion surrounded by a narrow scleral or scleral rim of approximately 2.00mm width, so constructed as to accommodate the flattest scleral fit likely to be called for.

A single fenestration of 1.50 mm diameter is placed at the scleral -corneal juncture. The internal transition is purposely left sharp to add to the accuracy for determining the correct lens clearance to the cornea. The lenses are optically worked and are designed for over refraction to determine the final lens power.

The basic measurements contained in a twenty-eight FLOM diagnostic lens set are found to cater for nearly all the ocular corneal variations. Lens increments of 0.25mm steps of the corneal diameter are adequate to allow for accurate lens evaluation.

GELFLEX FLOM DIAGNOSTIC SET - 28 LENSES

OPTIC DETAILS

LENS No.	OPTIC RADIUS	OPTIC DIAMETER
1	8.00	13.00
2	8.25	13.00
3	8.25	13.25
4	8.25	13.50
5	8.25	13.75
6	8.25	14.00
7	8.50	13.25
8	8.50	13.50
9	8.50	13.75
10	8.50	14.00
11	8.50	14.25
12	8.75	13.50
13	8.75	13.75
14	8.75	14.00
15	8.75	13.00
16	8.75	13.00
17	9.00	13.25
18	9.00	13.50
19	9.00	13.75
20	9.00	14.00
21	9.00	13.25
22	9.00	13.50
23	9.25	13.75
24	9.25	14.00
25	9.25	14.25
26	9.25	13.50
27	9.25	13.75
28	9.50	14.00

Scleral radius: 13.00mm
Fenestrations: x 1 hole just inside back optic
Power: -1.00

Engraving: Optic radius, optic diameter .
Material: PMMA
Overall diameter: 8.00mm

All trial lenses are manufactured with no blending on the back surface.

For additional fitting tips, tutorials, and more information on our extensive range available, visit **www.gelflex.com**

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CORNEAL HEIGHT

The accuracy of the corneal measurement has to be kept to within very fine limits. With FLOM diagnostic lenses, not only can the radius be stipulated correctly, but also the back optic diameter. This is particularly important in the fitting of preformed lenses. The corneal height or, strictly, the back optic height or sag for any given radius and diameter is consequently known. The correctness of the back optic curve and diameter may thus be predetermined, its clearance, position and alignment can be immediately observed, giving all the data which will be required for the final lens. An immediate picture is obtained as to how the selected back optic curve will look in the eye with the final lens ordered.

The corneal height is approximately the same for a similar increase of back optic radius and diameter. For example, an 8.00/13.00 (8.00mm back optic radius, 13.00mm diameter) will give about the same corneal height as an 8.25/13.25, 8.50/13.50.8.75/13.75, etc, that is all 3.33mm.

BUBBLE TEST

The FLOM diagnostic lens is inserted with Fluorescein and the resultant bubble formed between lens and eye observed. This will give the practitioner an immediate, though only general, impression as to the alignment and relationship present between lens and cornea. Every lens should be allowed to settle on the eye for at least one minute.

1. If the lens does not fill up at all, that is, if a large bubble presents itself centrally, it signifies that the back optic radius is either too steep or that the corneal height is too great.
2. If the lens fills immediately at the apex, with a large bubble circulating around the limbus and possibly extending slightly on to the sclera, the back optic radius is evidently too flat.
3. If the lens does not fill immediately with the patient's tear fluid but does so gradually, the radius is approximately correct, provided the resultant bubble circulates around the limbus and not beyond it. It should not traverse the pupil area and a central zone covering some two-thirds of the cornea should remain constantly filled with tear fluid.

DIGITAL PRESSURE TEST

Under condition 3, the correct corneal fit will be slightly in excess of capillary-like clearance, the rate and amount of lacrimal filling will have been noted and there will be a fluorescein film over the whole of the corneal surface. Finger pressure applied to the apex of the diagnostic lens will produce a corneal touch, the green fluorescein pattern turning purple-blue centrally when inspection is carried out under a cobalt blue beam of light. Release of finger-pressure will leave a distinct bubble spreading over the entire corneal surface.

CORNEAL CLEARANCE

Assuming that a FLOM diagnostic lens giving the desired cornea-lens alignment relationship and capillary clearance has been found. Back optic radius and diameter are known. It is then essential to make certain allowances in the back optic height for clearance to be maintained in the final lenses, after full settling has taken place.

If, for example, an 8.50/13.00 lens gives a capillary fit, that is, touch or clearance, the following corneal measurement is prescribed: 8.50/13.25.

Should the lens be fitted with too much space between the lens and the eye, a bubble that will encroach on the pupil area will occur. Although the lens will settle with wear and the bubble will becomes smaller, in our experience, this is not well accepted or tolerated with patients.

It is our preferred method to fit the lens so that an ideal bubble size or a slightly large bubble is present. Patients are monitored closely as the lens settles . Should corneal touch occur, a central grind of 3/100 mm to 5/100mm is made. It is much easier and quicker for the practitioner to effect accurately the grinding and polishing of the lens back optic than to settle the scleral part of the lens onto the eye.

THE LIMBAL FIT

It is important that the scleral lens completely clears the limbal area of the cornea.

The transitional curve between the optic and scleral radius is generally the mean of the two curves and is 2.00mm to 2.50mm in width. As a rule of thumb, this is 4.00mm flatter than the optic radius.

FENESTRATIONS

All gas permeable scleral lenses fitted have three evenly positioned fenestrations placed within the transitional curve of the lens.. The fenestrations are made in the laboratory. The resultant fenestrations are well polished and the edges well rounded.

GAS PERMEABLE SCLERAL LENS

FITTING GUIDE & LENS CARE

ENS MODIFICATIONS

With a normal cornea, the modifications that may be required are made as described above.

With Keratoconus the following method is used:

1. Use the FLOM diagnostic lens as described above, but ignore the central touch that will be present due to the cone. Aim to obtain a good bubble. Use this radius but allow an added 0.25mm to the optic diameter ordered, eg: FLOM fit: 8.50mm Radius. / Diameter 13.50mm. Order: 8.50mm Radius. / Diameter 13.75mm.
2. Do an over-refraction and calculate the residual power.
3. As the effect of grinding out steeper back optic curves to allow for lens clearance will increase the minus power of the lens, allow +3.00 Diopters extra to the lens power ordered, eg: Resultant Power = +3.00 Diopters.
   Lens power ordered = +6.00 Diopters.
4. Instruct the laboratory to allow extra central lens thickness to allow for central back optic grinding.

MODIFICATION METHOD

1. When the lens ordered is placed on the cornea, an area of central touch will be noted.
2. Note the area of touch. Remove the lens and mount the lens on a mounting chuck.
3. Measure the total lens and mounting chuck centre thickness. Note total thickness.
4. Grind out an area 1.00mm larger than the area of touch noted in (1) above, using a steeper radius tool, eg: if the lens radius is 8.50mm, use a 7.75mm radius tool. Measure and note the total centre thickness of the lens and mounting chuck. The difference in the thickness between (3) and (4) is recorded as the amount of material removed.
5. Polish lens.
6. Place the lens back in the eye. The area of lens of corneal touch will now be reduced.
7. Repeat (1) to (6) above using steeper grinding tools (e.g. 7.00 / 6.00) each time until complete corneal clearance with no corneal touch is observed.

Note: As the centre is ground out of the lens, this has the effect of dropping the lens back onto the eye and may reduce the limbal clearance. Should this occur, this area will need to be ground out. To do this, use a flatter radius tool (a 9.75mm and a 11.00mm radius tool). Polish and blend the curves well. This will increase the clearance in the limbal area.

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The content of this booklet is correct at the time of print, August 2018. F1072-01

LENS ORDER

Details required for gas permeable scleral lens order:

Back Optic Radius, eg 8.50mm
Back Optic Diameter, eg 13.50mm
Scleral Radius, eg 14.00mm
Scleral Diameter, eg 23.00mm
Lens Power, eg +15.00mm
Material, eg Harmony

KERATOCONIC SKK FLOM DIAGNOSTIC SET

We have developed a Keratoconic FLOM diagnostic set for the KERATOCONIC patient. The set consists of a series of lenses with increasingly conic back surfaces. This allows the diagnostic scleral lens fitting to be simplified and more accurate for the practitioner.

With the Keratoconic eye, we have found a Keratoconic FLOM lens set incorporating a scleral portion gives a more accurate diagnostic picture of the final lens fitting on the eye.

By placing the SKK Diagnostic lens on the eye, it is possible to achieve a very close relationship between the back surface of the lens and the Keratoconic cornea. With this Keratoconic diagnostic lens, minimal modifications are needed.

REVERSE GEOMETRY FLOM DIAGNOSTIC SET

This lens has a reverse geometry back surface and has been found invaluable when fitting a scleral lens to a cornea that has undergone RK or laser treatment. Each lens in the set has progressively less sag that the previous lens.

SUMMARY

The essential requirements are as follows:

1. Balance the scleral fit, over as large a scleral area as possible.
2. Correct alignment of the anterior corneal curve.
3. Adequate corneal clearance.
4. Freedom in the limbal area.
5. Maintenance of corneal and limbal clearance.
6. Correction of refractive error.

VIDEO AVAILABLE

A video fitting guide titled "A Practitioners Guide to Gas Permeable Scleral Lenses" is available by contacting Gelflex.