RGP Fitting Tips

Rules of thumb:

BOZD to BOZR relationship
(does not include larger diameter RGP’s or some proprietary designs):

*If increasing the BOZD by 0.5mm flatten BOZR by 0.05mm if similar fit required*

Power changes:

Changing BOZR changes the tear lens power:

*Flattening BOZR 0.05 changes the tear lens by -0.25D*

NB: Rule of thumb does not apply for small BC’s (eg keratoconics) or very flat BC’s – calculate instead

*Change in tear lens = \( \frac{337.5}{BOZR_{\text{final}}} - \frac{337.5}{BOZR_{\text{trial}}} \)*

[If final BOZR is steeper you will need more neg power to compensate for more plus in the tear lens]

For empirical calculations:

BVPcl = Ocular refraction – BVP tears

BVP tears = \( \frac{336}{BOZR} - \frac{336}{K} \) where \( K \) = radius front surface of cornea in mm
Basic Fitting nomograms

BOZR selection

Spherical K’s:     LD 9.0 to 9.7mm : On K or 0.05 flatter
                 LD 9.7 to 10.5mm: Flatter by 0.05 to 0.1mm

Corneal cyl:     < 1D: Fit on flat K
                 (~9.5 LD)  1 to 2D: 0.05 to 0.1mm steeper than flattest K
                 >2D: Use toric BOZR (unless astigmatism is central not limbus to limbus)

Please use these guidelines as a starting point for trial fitting. Specific lens designs may be fit slightly differently and if unsure call your lab and ask for advice. (Eg Gelflex 9.5mm RGP spheres are empirically fit 0.1mm steeper than flat K).

[For each 1D of corneal cyl you may want to increase CT by 0.02mm to decrease chance of warping (standard CT for high DK RGP materials is 0.18 for minus and 0.23 for plus)]. It may be best to leave this parameter to the manufacturer but also keep in mind that for very high plus RGP’s a lenticulated or a smaller front surface optic can be used to reduce lens thickness.

Residual astigmatism = Ocular astigmatism – corneal cyl (ie the astigmatism not due to the cornea). Astigmatic component to fully correct an eye wearing spherical BOZR CL

Induced astigmatism = The astigmatic effect introduced into the system every time toric BOZsurfaces are used due to the tear / lens boundary (ie 2 different RI’s)

Induced astigmatism = 1000 (1.336 – RI lens) / r

Compensated bitoric – FS cyl purely for correction of induced cyl. Corneal cyl = spec cyl. Can rotate on eye w/o visual disturbance (spherical power equivalent)

Toric RGP options:

1) Empirical data to lab – spec Rx, vertex dist if high Rx, HVID, K’s
   0.05 flatter than flat K, +0.25 to power
   0.10 flatter than steep K, +0.50 to power
   TD = HVID – 1.5 to 2mm

   At delivery, check VA and fit acceptable and ask patient to wear lens in for A/C
   Note location of laser engravings (typically on flat meridian)
   Fit and corneal assessment as per normal
   Perform spherical and spherocyl CLOR

2) Use empirical data plus trial lens and CLOR
   BVPcl = BVP trial + CLOR – (336/BOZR – 336/Kcornea) for each meridian
General Tips

Many US practitioners refer to these lenses as Gas Permeable vs Hard lenses – psychological conditioning 😊

Use a Wratten (#12 yellow) filter to enhance NaFl pattern (also great for picking up subtle staining).

For neophyte wearers fit RGP lenses after instilling a drop of local anaesthetic. This reduces excessive reflex lacrimation and allows for a gradual adaptation.

Unless the patient has a very light colored iris order lenses as green for RE and blue for LE – this will stop the patient getting them mixed up.

Request a negative carrier for (high?) plus lenses – stops them dropping low

Use of a protein cleaner will keep RGP’s in good condition for many years.

1) Menicon Progent – super clean once a month
2) Boston Liquid Enzymatic cleaner

Polish lenses once a year – send to your lab.

Material Selection

Most patients should have lenses ordered in the newer generations of hyper Dk, fluoro silicone acrylate materials (e.g., Boston XO). These provide excellent oxygen transmission for ocular health without compromising wettability, deposit and scratch resistance. Newer materials are available with and without UV filters.

Exceptions to advice would be:

1) Refitting an existing PMMA lens wearer. It is suggested low Dk materials are used initially as the cornea is rehabilitated. PMMA wearers may also be fairly rough in handling their lenses so increased hardness and modulus may help.
2) Ultra thin RGP designs – lower Dk materials with greater strength are recommended.
3) Sealed scleral designs or patients prone to hypoxia (e.g., graft patients) – third generation FSA materials e.g., XO2 are recommended as Dk is exceptional (141 ISO/Fatt)

Plasma coatings are available on many RGP materials but cannot be polished and do not allow modifications to a treated lens. Keep these lenses as clean as possible with Menicon Progent protein cleaner instead.
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<th>Clinical Consideration</th>
<th>Corrective Action</th>
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<td>Continually high, not dropping after blinks</td>
<td>Flat peripheral zone&lt;br&gt;Too large&lt;br&gt;Peripheral zone too wide&lt;br&gt;Thick lens edges&lt;br&gt;Negative lens</td>
<td>Steepen BOZR&lt;br&gt;Decrease diameter&lt;br&gt;Reduce PC Widths&lt;br&gt;Taper edges&lt;br&gt;Use plus lenticular edge</td>
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<tr>
<td>Continually low with rapid dropping after blinks</td>
<td>Lens too small&lt;br&gt;Too steep&lt;br&gt;Positive lens&lt;br&gt;Too thick&lt;br&gt;Heavy due to overall size</td>
<td>Increase diameter&lt;br&gt;Flatten BOZR&lt;br&gt;Use negative carrier&lt;br&gt;Reduce CT</td>
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<tr>
<td>Lens rides to side</td>
<td>ATR astigmatism</td>
<td>Use toric base&lt;br&gt;Steepen lens / reduce optic</td>
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<tr>
<td>Lens falls out</td>
<td>Too small, too flat&lt;br&gt;Edge stand off in KC</td>
<td>Larger or tighter lens&lt;br&gt;Use tuck</td>
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<tr>
<td>Hardly any movement from centre</td>
<td>Lens too steep and / or&lt;br&gt;Too large</td>
<td>Flatten BOZR and / or&lt;br&gt;Reduce size of optic / diam</td>
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<tr>
<td>Lens moves excessively and beyond the limbus</td>
<td>Lens too flat causing excessive movement&lt;br&gt;Spherical lens on toric cornea</td>
<td>Steepen BOZR or periphery as required&lt;br&gt;Use toric back surface or periphery</td>
</tr>
<tr>
<td>3&amp;9 o’clock staining</td>
<td>Edge profile and lens fit&lt;br&gt;Dry eye / VDU use</td>
<td>Incr/decr EL as required, try larger diameter, lubricants</td>
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<tr>
<td>Visual flare / haloes at night</td>
<td>Increased pupil size under low illumination impinging on optic diam of CL. Lens dropping low?&lt;br&gt;KC centering over low cone</td>
<td>Increase lens diameter (flatten BOZR to compensate)&lt;br&gt;See above&lt;br&gt;Refit in larger diam / design</td>
</tr>
<tr>
<td>Reduced acuity – initial</td>
<td>Residual astigmatism. Improper lens power</td>
<td>Perform CL OverRefraction&lt;br&gt;Check for flexing</td>
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<tr>
<td>Reduced acuity – late</td>
<td>Warped lens&lt;br&gt;Switched lens&lt;br&gt;Fogging from deposits</td>
<td>Check BOZR and power for warpage.&lt;br&gt;Progent / polish lens</td>
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