

KBco Wrap Solutions™

Lab Reference Manual©

**Outstanding Optics
In
Oversized Fashion and Performance Wrap Frames**



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Richard C. Palmer

ACKNOWLEDGEMENT
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Mr. Richard (Rich) Palmer of Practical Engineering, LLC wrote the KBco Wrap Solutions Lab Reference Manual after a great deal of research and in-lab processing of the Wrap Solutions lenses. Rich Palmer is widely recognized as an industry leader in laboratory processing of lenses and laboratory and lens technical issues.

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KBco Single Vision Wrap and EOS Wrap Solutions Lab Manual
Properties – Performance – Methodologies

Associated with

Dispensing and Laboratory Production of KBco Wrap Solutions Lenses

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Uniqueness of Prescriptions for Oversized Fashion and Performance Frames:

The introduction of so-called fashion and performance wrap frames requiring wrap around Rx lenses has given rise to some challenging and very unique ophthalmic fitting and lens power issues both at the dispensing table and in the production laboratory. These issues are magnified with oversized fashion and performance wrap frames.

Until recently, lenses for wrap frames have been made by producing the patient's Rx using spherical high base lenses which typically had a nominal front curve of 8.25 diopters. Unfortunately, the results have been patient discomfort and less visual acuity than that realized through the patient's so-called dress eyeglasses. This has been due in large measure to considerations not adequately being given to the need to re-calculate Rx powers because of the optical effect associated with large amounts of Panoramic (Face Form) Tilt in wrap frames.

In a high wrap frame, the Rx power is rotated about the two primary optical meridians, the tangential meridian along the horizontal and the sagittal meridian about the vertical plane. This rotational effect is often referred to as "Radial Astigmatism". The sagittal meridian may be considered as the Rx's spherical component and the tangential meridian equated to the cylinder Rx component.

The greater the degree or severity of the wrap angle of the frame, the greater the amount of compensating Rx power that will be required in these meridians to yield proper visual acuity and wearing comfort. (i.e. The same visual acuity a wearer experiences with dress eyeglasses. This is true not only for a compound Rx, sphero-cylindrical lens with an oblique axis, but also for a spherical power Rx.)

As an example, consider the following Rx to be placed in a wrap frame having a Face Form Wrap angle of 20° with 5mm decentration. Also, for purposes of illustration vertex distances of 13mm and 11mm Refracted and Fitting Vertex distances respectively have been used. A 9 degree Pantoscopic Angle has also been used. However, the effect that these two additional factors, vertex distances both refracted and fitted distances, have on re-calculating an Rx plus considerations for lens decentration will be noted and explained later.

Patient's Rx #1:

Lens material to be polycarbonate – material index = 1.586 & 8.25 base curve
Monocular PD = 32; Fitting height = 20; Wrap frame of 20° about the 90° meridian
Frame Dimensions = 56 "A", 40 "B"

Rx of -4.00 diopters

AccuCalc 6.2 Rx to Enter Into the LMS (Rounded with 1/8 diopters):

R: -3.37 -0.37 x 27 w/0.37 base in / 0.12 base up

L: -3.37 -0.37 x 153 w/0.37 base in / 0.12 base up

Patient's Rx #2:

Rx of +3.00 diopters --- all other parameters remain the same

AccuCalc 6.2 Rx to Enter Into the LMS (Rounded with 1/8 diopters):

R: +2.87 -0.25 x 117 w/0.62 base in / 0.25 base up

L: +2.87 -0.25 x 63 w/0.62 base in / 0.25 base up

Uniqueness of Wrap Prescriptions: (continued)

Thus far we have pursued examples only of wrap lenses for spherical Rx's. In the case of compound Rx wrap lenses, sphero-cylindrical lenses at an oblique axis, there will be a change in the cylinder axis as well as a change in the diopters values of the sphere and cylinder power components. At this point in any re-calculation of an Rx for wrap lenses, the calculations will involve considerations for cross cylinder powers.

To dramatize this, consider the following Rx example:

Patient's Rx #3:

R eye: -2.75 -1.75 x 135

L eye: -3.00 -1.00 x 40

Monocular PD = 32 / 32

Fitting height = 20

Pantoscopic Tilt = 9° & Face Form Angle = 20°

Frame Dimensions = 56 "A", 40 "B", & 14 DBL

Vertex distances = 13mm Refracted & 11mm Fitted

AccuCalc 6.2 Rx to Enter Into the LMS (Rounded with 1/8 diopters):

R = -2.62 -1.25 x 140 w/0.37 base in / 0.12 base up

L = -2.75 -0.75 x 29 w/0.37 base in / 0.12 base up

As you can see from the resulting calculations, there is little change in the sphere power but a more significant change in the cylinder power plus a change in cylinder axis of 5°, not a small amount when considering a cylinder power of almost 2.00 diopters.

Discussions with Dr. Clifford Brooks of Indiana University School of Optometry and through reference text as that noted in the footnote below¹ gave rise to recognition of one additional optical consequence which occurs in prescription lenses for wrap frames. Specifically, this additional cause and effect associated with wrap lenses involves the amount and direction of induced prism associated with the tilting of Rx lenses.

The amount of the induced prism is dependant upon not only the lens material index of refraction but also lens thickness, the radius or diopter value of the front curve, and respective to this discussion, the number of degrees of the tilt angle. Additionally the direction or base of the induced prism is dependant upon where light will enter the lens respective to the optical axis.

As is evident from the above brief discussions on a sampling of the optical effects of wrap lenses and the example Rx's cited, the fitting and production of lenses for fashion and performance wrap frames involves far more detail than is associated with that of so-called regular prescription dress wear.

However, with the ever increasing popularity of oversized fashion and performance wrap frames and the inherent effects associated with Rx lenses, the need to properly address and provide the eye wear consumer with maximum visual acuity is the challenge that confronts all within the optical community.

¹ M. P. Keating, Geometric, Physical, and Visual Optics, 2nd edition, Butterworth/Heinemann, St Louis, MO

Solution Based Specialized Lenses – KBco, Inc.

As previously stated, Rx lenses for wrap-performance frames have been produced using spherical 8 base front curve lenses with the result being reduced visual acuity for the wearer. Spherical 8 base lenses were designed to accommodate Rx's in a power range of +2.25 to +5.00 or +6.00, depending on the base curve selection criteria of the laboratory. This power range unfortunately does not encompass what studies show are the vast majority of Rx's that are produced for the wrap frame wearer. (i.e. minus powers in the -2.00D to -3.00D range)

Also, in many cases there has been a lack of any re-calculation of prescription values so very necessary to counter the effects of wrapping or tilting an Rx lens. However, these conditions are about to change.

KBco of Centennial, Colorado, is bringing to market a real and viable solution to this ever-present and challenging ophthalmic dispensing and laboratory production issue. The solution that KBco offers is an exclusively designed lens and a program that embraces far more than the mere introduction of a new lens product. The introduction includes a systematic approach to the issues outlined previously. Reference materials, software, explanation of the distinctive features and benefits of the new KBco Wrap Solution lenses, tools for the dispenser, and suggested methodologies of production obtained from actual laboratory surfacing and finishing tests performed at a leading university are also provided.

Specifically, the products known as **KBco Wrap Solution Polarized Lenses** bring to the marketplace a series of lenses with the following unique parameters:

Feature --- KBco Wrap Solution Lenses are offered in semi-finished single vision and the "EOS" progressive lens styles.

Significance ... the two most widely used lens designs for the active lifestyles of performance and fashion wrap sunglass wearers. Both lenses are made of polycarbonate material and come in the top three polarized sunglass colors-KBco Grey C, KBco True Grey and KBco Brown C.

EOS offers a wider than normal distance zone and a minimum fitting height of 17mm. These are key features for sunglasses desirable for outdoor sunwear and activities.

Feature --- KBco Wrap Solution Single Vision Lenses have designated right and left lenses.

Significance ... the lenses have engravings similar to progressive lenses. This was done to remain consistent with other lenses that require Monocular PD and fitting height measurements. Although we do not recommend doing so, it is physically possible to use a right lens for the left eye by turning it 180 degrees. In this case, the engravings that are normally at the top center of the lens would be in the bottom center of the lens.

Solution Based Specialized Lenses – KBco, Inc. (continued)

Feature --- KBco Semi-Finished Single Vision Wrap Solutions lenses are offered in a series of six (6) aspheric, 8.25 nominal front curves with each aspheric design made for a specific prescription range.

Significance ... six uniquely designed aspheric lenses provide an uncompromising optical medium alleviating distortion, unwanted astigmatism, and restricted viewing fields caused by spherical lenses produced for wrap frames. The six lens series accommodates an extensive Rx range covering total powers from +4.00 to -6.00.

The following chart provides the information needed to determine the appropriate Aspheric Indicator to use. The lens box tops identify the Aspheric Indicator of the lens enclosed in the box. The KBco Wrap Solutions Rx AccuCalc 6.2 software will automatically select the correct aspheric increment to use.

Nominal Base Curve	Aspheric Identifier	True Base Curve	Prescription Range
8.25	8.1	8.282	+4.00D to +2.25D
8.25	8.2	8.228	+2.00D to +1.25D
8.25	8.3	8.235	+1.00D to Plano
8.25	8.4	8.231	-0.25D to -2.00D
8.25	8.5	8.238	-2.25D to -4.00D
8.25	8.6	8.252	-4.25D to -6.00D

**Feature --- Single Vision Wrap Solutions lens blank parameters include:
+8.25 nominal front base curve with a -8.50 back curve
83mm blank diameter with 5mm of decentration built in
13mm blank edge thickness**

Significance ... The lens blanks are designed to enhance lab production through the entire surfacing area. For example: Assuming an Rx of -2.25D, a lens blank with an 8.50 back curve enhances the generating process significantly as opposed to blanks with a 6.25 back surface. This feature combined with an edge thickness of 13+mm provides the means to produce a wider array of Rx's via the ability to generate a steeper radius into the lens. Also, with a 5mm inset, much of the decentration needed for wrap Rx's is already achieved. (Frame/Patient PD's) 83mm of blank + 2 x 5mm of inset = 93mm effective lens blank.

Feature --- The KBco Single Vision Wrap and EOS Wrap lenses are polarized and made of Polycarbonate material; index = 1.586

Significance ... Polarized lenses are recognized as being the best lenses for sunwear. Polycarbonate is the optimal material for active lifestyles, safety, and sports activities.

Solution Based Specialized Lenses – KBco, Inc. (continued)

Feature --- Three most popular polarized lens colors: KBco Grey C, KBco True Grey, & KBco Brown C

Significance ... Wrap Solutions Lenses are available in the top high performance colors giving consumers a choice and great performance.

One final note regarding a feature or benefit of the KBco “Wrap Solution Lens” is perhaps warranted at this point.

Opticians at all stages within the eye wear delivery system have long known and understood the value of higher indices of lens material for significant minus and plus power Rx’s. The higher the index of refraction of the lens material, the less severe the surfacing curves required to produce the prescribed Rx; most significantly respective to higher minus lens powers.

Assuming that the typical lab has a tooling index of 1.53 μ , the use of Polycarbonate lenses on higher minus (or plus) Rx’s affords the lab to actually surface only approximately 90% of the indicated power to achieve the diopter value of the doctor’s prescription.

$$\begin{aligned} \text{Tool Index} - 1 \div \text{Material Index} - 1 &= \text{Percent of Indicated Power} \\ 1.53 - 1.00 \div 1.586 - 1.00 &= 90.4\% \end{aligned}$$

As such, the fact that the Wrap Solution Lens has a front curve of an 8.25 base, and making the valid assumption that a high percentage of Wrap Rx’s will be minus in power, the amount of concave curve surfaced into the back of the lens could and probably will have a significantly short millimeter of radius. Consider the following:

Rx: -5.00 sphere
Material of **CR-39**
Front curve of lens = 8.25d
Resulting back-side curve to be generated = approximately -13.62
Back-side curve radius = 38.91 mm

Same Rx of -5.00 sphere
Material: **Polycarbonate**
Front curve of lens = 8.25d
Effective surfacing power = 90% of -5.00d = 4.50d
Resulting back-side curve to be generated = approximately -12.87
Back-side curve radius = 41.18 mm

The point to be made here is that with the Wrap lens made of Polycarbonate vs. CR-39 for instance, the back-side curve(s) generated and surfaced into the lens is less and therefore provides the opportunity to fabricate higher powers than would otherwise be possible.

In laboratory/generator operator language; when generating curves for high minus Rx’s on an 8.25 front of Polycarbonate material, the probability of the curve “not going all the way across the lens” is greatly reduced.

Dispensing and the Wrap Rx:

It has been said that nothing happens until there is a sale. And this certainly applies to the optical industry with the front line being the ophthalmic dispensary.

In the past, prescription eye wear sales involving oversized fashion and performance wrap frames with a high degree of Panoramic Tilt (Face Form) or Wrap Angle, have oftentimes been lost due to a variety of real and very practical reasons. Frequently when such a sale did occur, the patient often returned complaining of blurred vision or distortion at the periphery of the lens among other things. The end result was either that the consumer returned their eyewear or was less than satisfied.

A primary goal of KBco Wrap Solution Lenses is to provide advanced lens designs with outstanding optics in oversized fashion and performance wrap frames. To ensure that Dispensers are able to take full advantage of Wrap Solutions lenses, they are supported with extensive product materials and dispensing tools to assist the ophthalmic dispenser in providing outstanding optics in these wrap frames.

Successful dispensing of Wrap Rx's leading to a satisfied customer involves technical and fitting issues that are, for many practical purposes, not of great concern with regular dress wear. However with Wrap Rx's there is a real need to address the geometric and physical optics involved when high base lenses are ground to powers that would ordinarily be surfaced on lower base curves.

Also, with Wrap Rx's, we must concern ourselves with the effects of Panoramic Angle (Face Form Angle), Pantoscopic Tilt Angle, and Vertex distance, both refracted and fitted distances. Obviously, the Wrap Rx becomes more complex than standard Rxs.

The KBco Wrap Solutions Rx AccuCalc 6.2© has default settings using standard measurements for Pantoscopic Angle, Panoramic Angle, Refracted Vertex and Fitted Vertex. These standard settings will deliver exceptional optics. If a Dispenser wants to fine tune the measurements by providing customized measurements for one or all of these, they may do so. However, they are not required to do so as the KBco Wrap Solutions Rx AccuCalc 6.2 will use standard measurements as default settings.

To assist Dispensers interested in providing customized measurements to their laboratory, KBco is providing two dispensing tools. One measures the actual Panoramic Angle (Face Form) of the actual frame being used. The other measures the Pantoscopic Tilt inherent in the actual frame being used. As discussed earlier, these two measurements are essential to the recalculating of the Doctor's Rx into values for the laboratory to surface into the lenses due to these specific tilt angles of the wrap frame.

Samples of both of these two dispensing tools may be found in **Appendix 5.**

An additional chart detailing Effective Wrap Determination can be found in **Appendix 4, #1.**

Dispensing and the Wrap Rx: (continued)

The mathematical basis behind the use of these measurements and the subsequent re-calculations of Rx powers are as follows: ²

Panoramic Angle (Face Form Angle)

“RA” change factor for the Spherical Component or Sagittal meridian:

$$\text{Equal to } \frac{1 + \frac{\sin^2 \Theta}{2n}}{1}$$

“RA” change factor for the Cylinder Component or Tangential meridian:

$$\text{Equal to } \frac{2n + \sin^2 \Theta}{2n + \cos^2 \Theta}$$

For both formulas:

Θ equals the angle of Panoramic Angle (Face Form Angle) of the frame
 n equals the index of refraction of the lens materials utilized

To complete the re-computation of the original lens powers, the “RA” change factors are divided into the original sphere and cylinder diopter values.

Specific to the Pantoscopic Tilt, which is rotational about a horizontal axis, there is an alteration or change in one’s effective sphere power while also inducing a cylinder power along the horizontal or 180 meridian. This is in direct contrast to Panoramic Angle (Face Form tilt) in that with Pantoscopic tilt sphere and cylinder powers are altered about the vertical or 90 meridian.

Application of Martin’s Formula³ will dramatize the effect that this element of frame tilt will have on an Rx, thereby showing added cause for Rx recalculations so necessary for the wrap Rx:

$$S' = S [1 + (\sin \alpha)^2 / 2n]$$

$$C' = S' (\tan \alpha)^2$$

Where ... S' equals the new sphere power

S equals the original sphere power

α equals the degrees of tilt

n equals the index of refraction of the lens material

C' equals the induced cylinder on axis of rotation

In like fashion to the previously shown formulations for Panoramic and Pantoscopic angles, the vertex distance of wrap frames compared to that of dress wear frames also will have an effect upon the Rx eventually produced once recalculation of powers is accomplished.

² M P Keating, Geometric, Physical, and Visual Optics, 2nd edition, Butterworth / Heinemann, St Louis, MO

³ Stoner & Perkins, Advanced Optical Formulas, Butterworth – Heinemann, Newton, MA

Dispensing and the Wrap Rx: (continued)

Again with all respect of reference to Stoner and Perkins⁴, calculations of vertex distance yields an effective power formula of:

$$D_E = \frac{D_L}{(1 + dD_L)}$$

Where: D_E = new effective power
 D_L = original lens power
 d = change in vertex distance in meters

If the lens is moved toward the eye in that the refracted distance is greater than the fitted distance, the value of “d” is positive. The converse is true if the lens fitted distance is greater than the refracted distance.

In as much as various ophthalmic formulas and their applications can be a bit overwhelming, it is nonetheless important to understand how and in what manner the unique aspects of wrap frame fitting has on a patient’s Rx as well as to what degree the Rx which will ultimately be produced differs from that written by the prescribing doctor.

To simplify the communication with the production laboratory of the fitting dynamics relative to frame Pantoscopic and Panoramic Angles, the previously mentioned dispensing charts / tools will hopefully find their value at the dispensing table.

During the course of this project a study of wrap angles and frames sizes were examined relative to over 350 of perhaps the most popular wrap frames on the ophthalmic market. These products represented many well respected frame manufacturers such as Charmant, Luxottica, Marchon, and Safilo, to name but a few.

The purpose in studying these frames was to determine statistically what would constitute an average amount of Panoramic Angle (Face Form Angle) that these products represented. Additionally, it was also important to ascertain an average frame size / frame PD relative to the “A” box measurement and the frame’s DBL.

Also during this investigation a collection of wrap frames were examined to determine the possibility of an average Pantoscopic tilt value. And finally, during the laboratory lens production testing phase of the project, numerous wrap frames were checked to determine how close the produced wrap lens would fit to a patient’s face; i.e. the vertex distance as described above.

⁴ Stoner & Perkins, Optical Formulas, Butterworth – Heinemann, Newton, MA

Dispensing and the Wrap Rx: (continued)

The findings to these investigations revealed that there were indeed average values that could be supplied to the dispenser to further assist in the fitting of wrap lenses to fashion/performance wrap frames. The results are as noted below:

Average Panoramic Angle = 20° Average Pantoscopic Tilt Angle = 9°
Average Vertex Fitting Distance of the Wrap Lens = 11mm
Average Vertex Refracting Distance = 13mm

The net result of the production of the Panoramic (Face Form) and Pantoscopic diagrams and the average values determined from the frame studies is the availability of several options to the Dispenser for communicating specific fitting parameters to the laboratory.

We recommend that the dispenser use these standard measurements unless they are confident in their ability to measure customized Panoramic, Pantoscopic and/or Vertex measurements. However, if the Dispenser wants to provide custom measurements for Panoramic Angle, Pantoscopic Tilt Angle and/or the Fitting Vertex, they may do so. The exclusive KBCo Single Vision Wrap Solutions 6.2 software has been developed to use standard measurements or custom measurements. Exceptional optics may be achieved with either method.

Basic to all good frame selection relative to the patient's PD and his/her prescription is the long valued concept of making the attempt to match frame PD to the facial dimensions of the patient, as closely as possible. In other words, the attempt to keep lens decentration to a minimum while still being mindful of fashion and the principles of life style dispensing is certainly desirable.

From a practical point of view this is and perhaps always will be good practice. But in the frame study noted above it was found that a so-called "average wrap frame" measured 59.3mm along the "A" box and measured 16.4mm of distance between lenses thereby yielding a frame PD of 75.7mm.

As menacing as this may be when considering average PD's for men and women in the ± 60 mm and 65mm range respectively, one of the true features of the 83mm KBCo Wrap Solution Lens is that the semi-finished single vision lens blank has a built in decentration of 5mm. From a laboratory perspective this is a real production-related advantage. But, it does not preclude making all possible attempts to minimize required decentration relative to frame-to-patient PD's by the professional dispenser.

As with progressive lenses, greater accuracy of optics can be obtained if the dispenser supplies the lab with monocular PDs for all wrap Rxs. Additionally, because of the nature of wrap frames and the pantoscopic angles involved with such frames, greater accuracy of optics can also be obtained if the dispenser supplies the lab with the desired location of optical centers for the lenses.

While the Wrap Solutions is available in both single vision and progressive styles, it is recommended to fit the single vision lens as if it were a progressive. The best results will be achieved when the Dispenser provides a monocular pupillary distance and a monocular fitting height (pupil center). It is acceptable to use different Aspheric Indicators (i.e. 8.1 and 8.2) on the same prescription if a patient's RX falls in different prescription ranges.

With larger wrap frame designs the fit is subject to variation from wearer to wearer. If the frame rides higher or lower, the fitting height will help the lab optimize lens performance by positioning and edging the lens on an individualized basis.

Laboratory Production and the Wrap Rx:

At this point in the fitting, production, and delivery cycle of a Wrap Rx, the dispenser has assisted the patient in selecting the most suitable frame consistent with the patient's Rx and PD. Also the dispenser has decided to have the laboratory use "average" values for re-calculation of the Wrap Rx or supplied the lab with specific Pantoscopic Tilt, Face Form Angle, and Vertex distance measurements.

KBco Wrap Solutions lenses represent a true advancement in optics for wrap frame prescriptions. To ensure that laboratories have everything needed to process these lenses correctly it was felt that the lenses, technical data, and Rx Calculator should undergo live testing in a functioning facility. The results of that testing are outlined below and were gathered from processing Rx's using KBco Wrap Solutions lenses at the Indiana University School of Optometry (IU) laboratory in Bloomington, Indiana.

As will be made evident, test Rx's were processed through areas of the IU lab that mirror those of a traditional wholesale production laboratory. The findings of this testing phase and accompanying explanations will be presented in bullet point format along with a short narrative where appropriate.

The processing equipment employed in the IU facility is not unlike that found in most modern wholesale laboratory facilities across the country. Below is a listing of the equipment that was utilized during the test process.

It should be made clear that the equipment listed is purely for purposes of explanation and does not in anyway represent a preference toward any manufacturer or equipment model respective to processing KBco Wrap Solutions lenses. It is felt that optical machinery marketed by manufacturers not listed will also, under proper and vendor recommended operating procedures, yield the like quality results as equipment shown here.

Frame Tracing & Rx Entry:

- Optronics 4T Frame Tracer
- CC Systems Rx Order Entry & Laboratory Calculation Software

Lens Surfacing:

- GerberCoburn Step-One Surface Blocker
- GerberCoburn SGX Toric Generator
- 3 ¼ all aluminum surfacing labs --- 0.10d increments, 1.53 index
- GerberCoburn Toric Surfacers (finers and polishers)

Edging & Finishing:

- Optronics 6ES Patternless Edger
- GerberCoburn Kappa Patternless Edger

Laboratory Production and the Wrap Rx: (continued)

Frame Tracing ... processing and results

- Tracing of a wrap frame or sample lens from the wrap frame is difficult due to the extreme Panoramic (Face Form) Angle of the frame and lens.
- Difficulty of mounting the frame into the tracer's frame holder sufficient to having the stylist rotate through a complete frame circumference lead us to tracing the lens for most wrap frames used in the testing.
- It was felt that a truer and more precise geometry could be obtained by tracing the wrap lens.
- It should be understood at this point that tracing the wrap lens provides better "shape" geometry but the lens size exactness may suffer
- However the opposite was found valid in that a frame trace yielded better size geometry but as was discovered during the test phase the shape geometry was found lacking.
- Tracing of the sample lens from the wrap frame proved to be far less difficult in that the "lens only" holding device allowed the stylist to navigate a complete rotation of circumference.

For the most part this size vs. shape trade-off is due to the extreme "Z" axis displacement that is required to obtain exactness of both size and shape regardless of whether the frame or the lens is traced. High front curve frames such as wrap frames created the need to account for more than the usual "X" axis "A" box measurement and the "Y" axis "B" box measurement.

This is in contrast to the tracing of dress wear frames in that here the "Z" displacement is far less severe due to the toric bend of dress frame approximating a diopter value of +4.00. to +6.00; the wrap frame has for the most part frame curves of 8.25d or more.

Suggested laboratory procedure would be to trace the sample lens from the wrap frame to gain the best possible geometric shape. This proved to be a good trade-off relative to the downstream processing of edging and finishing.

Laboratory Production and the Wrap Rx: (continued)

Rx Entry ... processing and results

Sample Rx's were written and processed through the lab's calculating software using both CR-39 and Polycarbonate lens materials having spherical 8.25D nominal front curves.

The same Rx's were processed using the Wrap Solution Lens of Polycarbonate material in conjunction with the KBco Wrap Solutions Rx Calculator 6.2 software which made use of and accounted for Panoramic (Face Form) Angle, Pantoscopic Tilt Angle, and Vertex Distances.

Please reference the spreadsheets in Appendix 4 (#2 & #3):

-Spherical CR-39 vs. KBco's Polycarbonate Single Vision Wrap Solutions lens.

-Spherical Polycarbonate vs. KBco's Polycarbonate Single Vision Wrap Solutions lens.

Two primary Wrap Frames used in this sample Rx /Wrap Lens test:

1. Converse Tornado, 60 x 15, Wrap Angle 22°, Pantoscopic Tilt of 13°
2. Costa del Mar HH11, 64 x 19, Wrap Angle 25°, Pantoscopic Tilt of 8°
3. Patient's required decentration of 5 mm in

The key elements to examine in both of these comparative spreadsheets are:

How the original Rx for spherical lenses differs from the re-calculated Rx after using AccuCalc 6.2 when Panoramic and Pantoscopic tilt angles and vertex distances are accounted for ... columns 1 and 13.

Respective to minus power Rx's --- notice the significant differences in back-side curves required to obtain the resulting Rx, both in spherical lenses and in Wrap lens ... columns 2 and 14.

In the calculations for an Rx using the Wrap lens it is interesting to note the often significant differences in the original Rx and that which will be produced in the lab when the factors of tilt and vertex are considered ... sphere, cylinder, and axis.

On both of the comparative spreadsheets the more dramatic examples of the above have been highlighted.

The reasoning behind drawing comparisons of the Polycarbonate KBco Wrap lens and spherical CR-39 as well as spherical Polycarbonate lenses is that there have been instances where so-called wrap Rx have been produced using both of these spherical lens designs. To appreciate the differences in the design of the Wrap lenses, it was felt that this approach was warranted.

Laboratory Production and the Wrap Rx: (continued)

Rx Entry ... processing and results (continued)

Suggested Lab procedure for Rx Order Entry

Enter the doctor's original Rx into the KBco Wrap Solutions Rx AccuCalc 6.2 software using either the Pantoscopic Tilt Angle, Face Form Angle, Fitting Height, Vertex Distances, and Monocular PD supplied by the Dispenser

... or ...

Use the "average" values for tilt, angle, and vertex, re-stated below, into the KBco Wrap Solution software.

- Ave. Pantoscopic Tilt = 9°
- Ave. Face Form Angle = 20°
- Ave. Fitting Height = ½ of "B"
- Ave. Vertex Distances, Refracted = 13mm, Fitted = 10mm

We believe that the vast majority of the prescriptions received by laboratories from dispensers will not have customized measurements provided. The software is populated with the standard measurements to expedite processing.

- Print the resulting re-calculated Rx from the KBco Wrap Solutions Rx Calculator 6.2 software ... a sample copy of the print-out of the re-calculated Rx is shown on page 16.
- Enter the re-calculated Wrap Rx results into the lab's normal software system used to process all other Rx work.
- Respective to PD's and decentration, order entry personnel should follow the procedures of the software to ensure that the optical centers are surfaced 5mm in to match the built in lens blank decentration of 5mm.
- Dispensers need to provide a monocular PD and fitting height for all KBco Wrap Solutions prescriptions. These will be entered in the lab software in the usual manner.

Laboratory Production and the Wrap Rx: (continued)

Rx Entry ... processing and results (continued)

Rounding and Tool Index for Lens Calculations

1. **Rounding** – most if not all labs will “round” a surfacing calculation for either the sphere &/or cylinder power’s UP to the nearest 1/10th diopter.

As an example:

Unground calculation for -3.00 – 1.25 x 90° - lens to be surfaced on a 4.23 True Base Curve Polycarbonate Polarized blank

$$\begin{aligned} &[(\text{Tool Index} \div \text{Material Index}) \times -3.00] + 4.23 = 6.94 \\ &(1.53 - 1 / 1.586 - 1) \times -3.00 = 2.713 \qquad 2.713 + 4.23 = 6.94 \\ &\text{*Rounded to 7.00 for the sphere component} \end{aligned}$$

$$\begin{aligned} &[(\text{Tool Index} \div \text{Material Index}) \times 1.25] + 6.94 = 8.07 \\ &(1.53 - 1 / 1.586 - 1) \times -1.25 = 1.13 \qquad 1.13 + 6.94 = 8.07 \\ &\text{*Rounded to 8.10 for the cylinder component} \end{aligned}$$

Surfacing curves become -7.00 / -8.10

The reason for the rounding **Upwards** is, for the most part, because of the inherent motion effect of cylinder machines. Cylinder machines may have a tendency to flatten the lens curves, therefore to lesson the effect of the motion we round in the next higher 1/10th or 1/8th direction.

2. **Tool Index differences** – Because of the increase in the use of higher indices of refraction, many labs are starting to purchase new tooling in an index NOT of 1.53 but of 1.60.

Using the same Rx as above, the differences in the surfacing curves are as follows:

$$\begin{aligned} &(1.60 - 1 / 1.586 - 1) \times -3.00 = 3.07 \qquad 3.07 + 4.23 = 7.30 \\ &\text{No rounding required – one of the benefits of 1.60 tooling higher index lenses.} \end{aligned}$$

$$\begin{aligned} &(1.60 - 1 / 1.586 - 1) \times 1.25 = 1.279 \qquad 1.279 + 7.30 = 8.58 \\ &\text{Less rounding required - the higher tool index lessens the need to round (up or down).} \end{aligned}$$

Laboratory Production and the Wrap Rx: (continued)

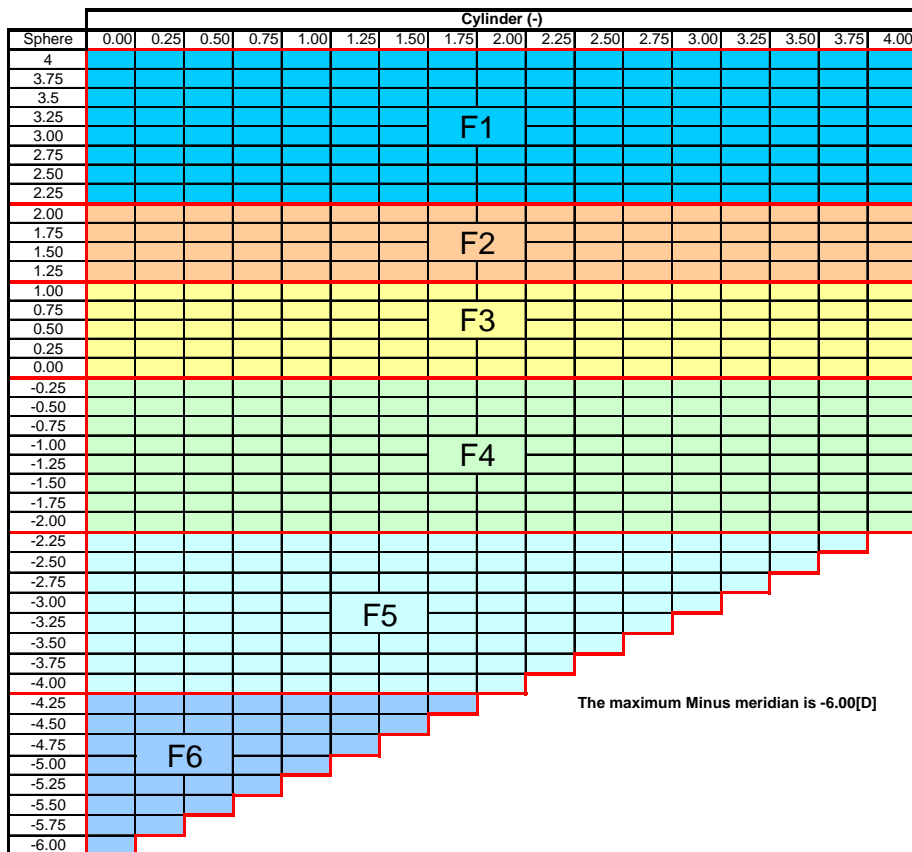
Rx Entry ... processing and results (continued)

-Pick the required Wrap Solution lens identified by the KBco Wrap Solutions Rx Calculator 6.2 and proceed to lens surfacing. The software will indicate which of the six different Aspheric Designs to use. Each aspheric design addresses a specific Rx range. The aspheric designs are shown below:

(Note: Please find the Eos 8 Base Wrap Prescription Chart in **Appendix 4, #4**)

Nominal Base Curve	Aspheric Identifier	True Base Curve	Prescription Range
8.25	8.1	8.282	+4.00D to +2.25D
8.25	8.2	8.228	+2.00D to +1.25D
8.25	8.3	8.235	+1.00D to Plano
8.25	8.4	8.231	-0.25D to -2.00D
8.25	8.5	8.238	-2.25D to -4.00D
8.25	8.6	8.252	-4.25D to -6.00D

KBCO SV - Base 8 WRAP – Prescription chart

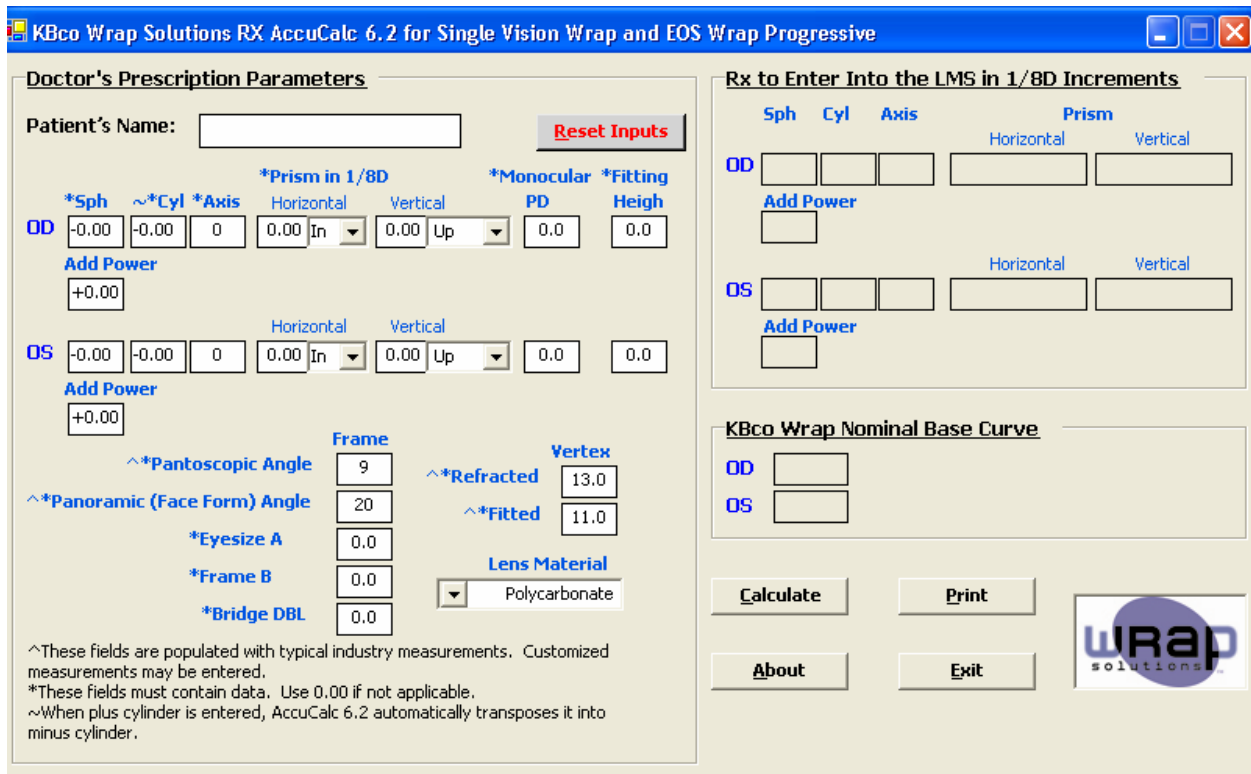


Laboratory Production and the Wrap Rx: (continued)

Rx Entry ... processing and results (continued)

KBco Wrap Solutions Rx AccuCalc 6.2

It is interesting to note the KBco Wrap Solutions Rx AccuCalc 6.2 print-out shows the values used for Pantoscopic Tilt, Panoramic (Face Form) Angle and the Vertex distances and one other value previously not discussed--“True Wrap” angle.



This designated “True Wrap” angle is that which results when the software automatically considers the effect that lens decentration has on the Wrap Angle value used. This True Wrap is a calculated value resulting from moving the optical center inwards respective to the patient’s PD. In essence the Face Form Angle or Wrap Angle is reduced or partially neutralized by the effects of lens decentration. A diagram of this effect is shown on the page following the Wrap Rx sample print-outs.

As a result of considerations for this additional unique issue involved in Wrap prescriptions, Rx calculations / re-calculations will yield more precise lenses for the wrap frame wearer. This is also noted in column 10 of the sample Rx comparative spreadsheets noted earlier.

Laboratory Production and the Wrap Rx: (continued)

Rx Entry ... processing and results (continued)

Also included on the Wrap Rx print out are values for Rx prism but the values represented are somewhat counter-intuitive to that which we are used to seeing respective to prism base direction. In the example shown on the print-out, the base direction for the minus power Rx is “base in”; generally prism for minus Rx’s is “base out”.

You will recall the discussion of induced prism associated with wrap or tilted lenses. KBCo Wrap Solutions Rx AccuCalc 6.2 software takes this unique optical circumstance into account to provide the Wrap Solution Lens user with one more feature to yield a better Rx for the wearer.

Lens surfacing ... processing and results

- Lenses were blocked on blank center using the GerberCoburn Step-One “Wax” blocker following all normal and customary surfacing blocking procedures.
- The wax blocked lens was allowed to set or cure for the normal amount of time utilized by most laboratories ... 15 to 20 minutes.
- The test lenses were generated using the GerberCoburn SGX generator with the following modifications made to the cutting parameters of the Polycarbonate lens file:
 - Depth of Cut set to 2.5
 - Final Depth of Cut set to 1.5
 - No changes made to the feed rates
 - All other parameters remained set to manufacturer’s recommendations

NOTE: It may be worthwhile to establish a new material file noted as “WRAP Poly”

- Note also that in using this model of generator the “Poly 3-flute” cutter was used
- Respective to the primary operating screen, the following parameters for lens generating are of special note:
 - Lens diameter should be set to = 84mm
 - Lens Edge Thickness should be set to 16mm **NOT** the 13 that can be measured from the lens blank.
 - Lens Back Curve should be set to 8.50d
 - Set the “A Decentration” field (on an SGX generator) to 5mm if provision for this have not been made by the lab’s calculating software at order entry ... this will generate the optical center 5mm in to match the 5mm of decentration in the Wrap lens blank.

Laboratory Production and the Wrap Rx: (continued)

Lens surfacing ... processing and results (continued)

Important --- all lenses should be cribbed to the smallest practical diameter during the generating process for the same reason that lenses are cribbed on “regular” Rx work.

Lens cribbing is especially worthwhile with Wrap lenses due to the depth of curve that will be generated and subsequently fined and polished. With back curves of -9.00, -10.00, and upwards, the smaller the lens that will be fined and polished the better.

NOTE: If the generator used by a lab processing the KBco Wrap Solutions Rx lenses has the capability of producing its own surfacing lap, it was found to be desirable. All aluminum laps in the 10.00 and 11.00 diopter range will measure about 68 plus millimeters across the 180°. Generator produced laps of this range measured 75 plus millimeters across the 180°. The significance of this is the presence of lens “over-hang” during the fining and polishing process

-Test lenses were fined and polished using normal surfacing procedures and the same surfacing pad configurations for fining and polishing as the lab uses with other lenses of Polycarbonate material.

-One caution worthy of note:

Because of the high diopter back-side curves on Wrap Rx lenses, and the limiting combination of lap size and lens size, the operator at the fining and polishing work stations would do well to critically inspect the lenses for imperfections such as generator marks, un-fined pits, etc.

Lens Cleaning

Temperature of cleaning water.

It is best if the lenses are not exposed to temperatures over 160 Degrees Fahrenheit.

Frequency of vibration in the ultra-sonic.

The lab should set to a low frequency if possible. High frequencies may causes problems.

PH value of the cleaning chemicals.

Cleaning solutions should have a PH between 7.0 and 7.3.
(A neutral PH is 7.0)

Recommended cleaning solvents are:

IPA (Isopropyl alcohol)
EcoSolve by Satis with a PH of 7.0

Laboratory Production and the Wrap Rx: (continued)

Edging and Finishing ... processing and results

The edging and finishing part of processing these special Rx's is where the art, skill, and craftsmanship of the finish optician will be tested and challenged measurably. At this point the finishing optician has received a high base lens with an extreme amount of back-surface curve and a trace geometry that is a trade-off of size vs. shape.

-During the testing of wrap lenses it was found desirable prior to any edging operations to crib the surfaced lenses to one of two crib shapes. Reference the crib shapes in Appendix 4, #5 & #6.

-A "crib pattern" was made to reduce the "B" measurement of the surfaced lens by approximately 10mm. One shape had a "flat" B measurement and another crib pattern was produced yielding a curved "B" dimension.

-Because the Wrap lens has a long "A" measurement and a relatively short "B" dimension it was found that by cribbing the lenses, a considerable amount of torque was eliminated when the lenses were edged in the patternless edgers.

-IMPORTANT: Additionally, whether the lenses were cribbed or not, because of the extreme A & B differences, it was found desirable to edge the lenses large on the first pass through the edging cycle and on the second pass re-set the edger to the desired size.

-Reference the discussion on lens vs. frame tracing ... when the lens trace was used as the geometry accessed by the patternless edger, the resultant lens after edging was superior in shape to that when the frame trace was used ... however, exactness of size was sacrificed some.

-Because of this the shape vs. size reality, the subsequent hand edging played a significant role in the final lens finishing quality obtained.

With most, if not all, of the wrap plastic frames examined during the test, the upper nasal and lower temporal eye wires were not flat relative to the front-to-back construction. Because of this the hand edging of the auto-edged lenses played a critical role in the ultimate quality of the lens-to-frame fit and the ability of the lens to stay in the frame's eye wire.

Care in hand edging must also be taken in bringing the "A" measurement to proper size while keeping the bevel to the front of the lens to avoid what the "white walled tire effect" that will result in all polarized lenses with the bevel too far back on the lens.

Laboratory Production and the Wrap Rx: (continued)

Edging and Finishing ... processing and results

With regard to patternless edgers or edgers in general respective to edging and finishing of wrap Rx lenses:

-If possible, edge the lenses on equipment that allows the operator to adjust the pressure exerted on the lens during the edging cycles.

-And ... if the equipment has the operational capability, run the edger through the “rough cycle” a couple of times to reduce the lens circumference a little at a time to avoid an introduction of excess torque or twisting of the lens.

-... then process the lens through the finishing and/or polishing cycle(s).

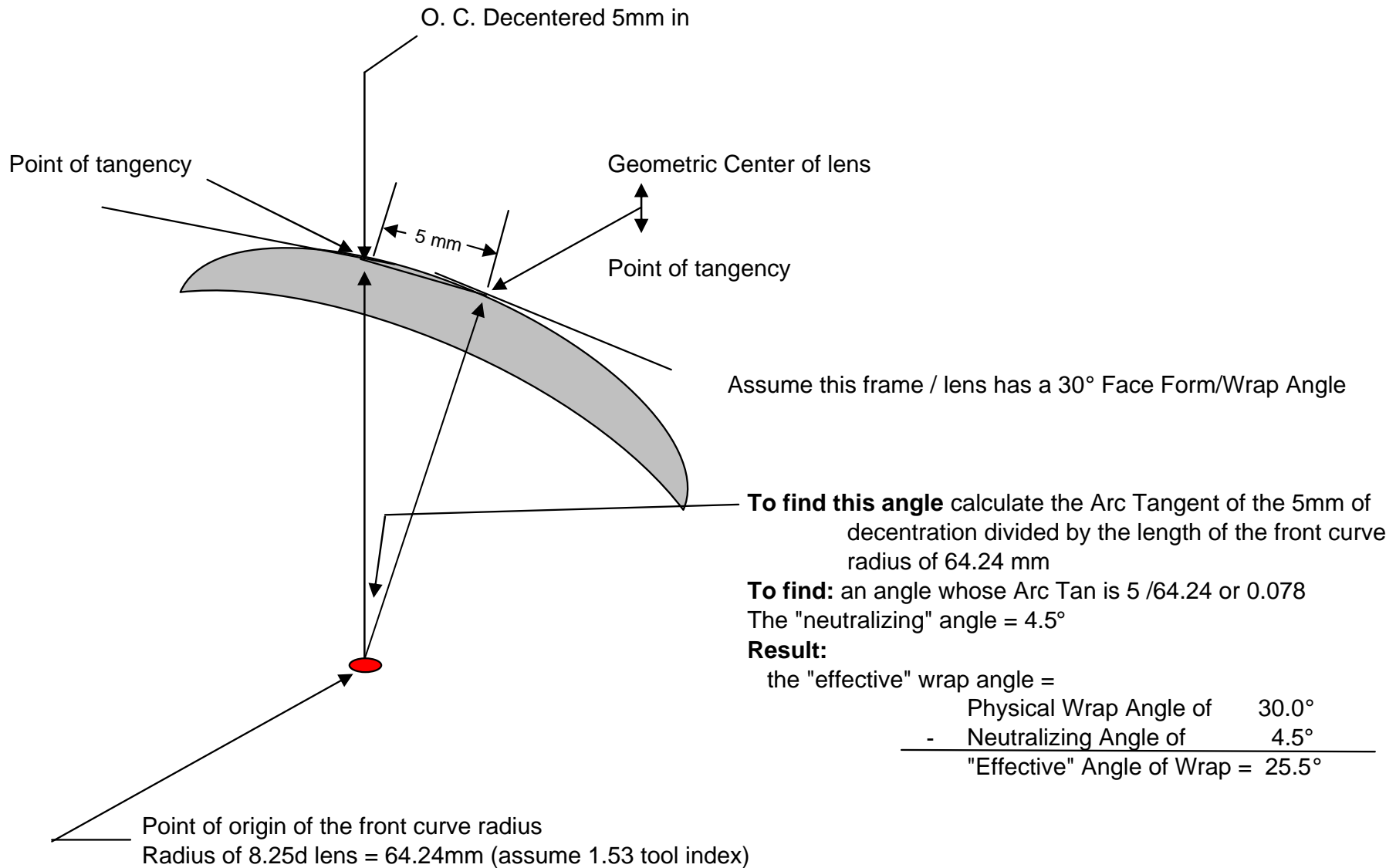
It is hoped that the above experienced and suggested lab procedures will benefit laboratory technicians and order entry specialists in processing KBco’s Wrap Solution Lenses resulting in delivering outstanding optics to wearers of wrap frame prescriptions.

END OF MANUAL

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Effective Wrap Determination Caused by O.C. Decentration





Surfacing Variances CR-39 vs KBco Poly Wrap Solution

Sample Rx's --- Relationship between Wrap / Tilt Specified & Standard Wrap & Tilt

Job #	Using Nominal 8.25 Base (CR-39) Spherical Blanks		KBco Lens "F"		R/L	Patient's RX	Rx After Vertex Distance Calculations ³	Physical Wrap Angle ¹	Neutral. Angle ⁴	Effective Wrap Angle	Tilt Angle ¹	Rx After Warp & Tilt Calculations	Wrap Solution (Poly) Aspheric Nominal 8.25 Base	
	Rx Power to Surface	Resultant Surf Curves	Series	Job #									Resultant Rx to Surface ²	Resultant Surf Curves ²
Column →	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	-3.00 -1.00 * 45°	-11.60 / -12.70	F5	A	R	-3.00 -1.00 * 45°	-2.97 - 0.98	22°	4.5°	17.5°	13°	-2.46 - 1.32 * 42	-2.50 - 1.37 * 42	-10.60 / -11.80
B	-2.50 sphere	-11.10 sph	F5	B	L	-2.50 sphere	-2.48 sph	22°	4.5°	17.5°	13°	-2.04 - 0.34 * 143	-2.00 - 0.37 * 143	-10.20 / -10.50
C	-1.00 - 2.00 * 90°	-9.50 / -11.60	F4	C	R	-1.00 - 2.00 * 90°	-1.00 - 1.98	22°	4.5°	17.5°	13°	-0.90 - 1.71 * 86	-1.00 - 1.75 * 86	-9.30 / -10.90
A	+ 1.25 - 1.25 * 180°	-7.20 / -8.50	F2	A	R	+ 1.25 - 1.25 * 180°	+1.25 - 1.25	22°	4.5°	17.5°	13°	-1.09 - 1.09 * 178	-1.12 - 1.12 * 178	-9.30 / -10.30
B	+ 0.50 - 2.00 * 45°	-7.90 / 10.00	B	B	L	+ 0.50 - 2.00 * 45°	+0.50 - 1.99	22°	4.5°	17.5°	13°	-0.48 - 1.71 * 45	-0.50 - 1.75 * 45	-8.80 / -10.40
C	-1.25 - 1.75 * 75°	-9.70 / 11.60	C	C	R	-1.25 - 1.75 * 75°	-1.25 - 1.73	22°	4.5°	17.5°	13°	-1.08 - 1.64 * 70	-1.12 - 1.64 * 70	-9.30 / -10.80
A	+ 1.00 - 0.75 * 135°	-7.40 / 8.20	F3	A	R	+ 1.00 - 0.75 * 135°	+1.00 - 0.75	25°	4.5°	20.5°	8°	+0.95 - 0.75 * 134	+1.00 - 0.75 * 134	-7.40 / -8.10
B	+0.75 - 1.25 * 50°	-7.60 / 8.90	B	B	L	+0.75 - 1.25 * 50°	+0.75 - 1.25	25°	4.5°	20.5°	8°	-0.72 - 1.13 * 50	-0.75 - 1.12 * 50	-8.90 / 9.90
C	+1.50 - 0.50 * 45°	-6.90 / 7.40	C	C	R	+1.50 - 0.50 * 45°	+1.51 - 0.50	25°	4.5°	20.5°	8°	+1.25 - 0.29 * 50	+1.25 - 0.25 * 50	-7.10 / -7.30
A	-1.00 - 2.00 * 90°	-9.50 / 11.60	F4	A	R	-1.00 - 2.00 * 90°	-1.00 - 1.98	25°	4.5°	20.5°	8°	-0.90 - 1.70 * 86	-1.00 - 1.75 * 86	-9.20 / -10.80
B	-1.25 - 1.75 * 75°	-9.70 / 11.60	B	B	L	-1.25 - 1.75 * 75°	-1.25 - 1.73	25°	4.5°	20.5°	8°	-1.17 - 1.34 * 79	-1.12 - 1.37 * 79	-8.10 / -9.30
C	-2.00 sphere	-10.50 sph	C	C	R	-2.00 sphere	-1.98 sph	25°	4.5°	20.5°	8°	-1.64 - 0.27 * 37	-1.62 - 0.25 * 37	-9.80 / -10.00
A	-2.50 sphere	-11.10 sph	F5	A	R	-2.50 sphere	-2.48 sph	22°	4.5°	17.5°	13°	-2.04 - 0.34 * 37	-2.00 - 0.37 * 37	-10.10 / -10.40
B	-3.00 - 1.00 * 45°	-11.60 / 12.70	B	B	L	-3.00 - 1.00 * 45°	-2.97 - 0.98	22°	4.5°	17.5°	13°	-2.46 - 1.32 * 42	-2.50 - 1.37 * 42	-10.60 / -11.80
C	-2.75 - 9.25 * 115°	-11.30 / -11.60	C	C	R	-2.75 - 9.25 * 115°	-2.73 - 0.25	22°	4.5°	17.5°	13°	-2.43 - 0.20 * 50	-2.37 - 0.25 * 50	-10.50 / -10.70
A	-4.25 sphere	-12.90 sph	F6	A	R	-4.25 sphere	-4.20 sph	22°	4.5°	17.5°	13°	-3.45 - 0.57 * 37	-3.37 - 0.62 * 37	-11.40 / -12.00
B	-4.25 - 0.50 * 50°	-12.90 / -13.40	B	B	L	-4.25 - 0.50 * 50°	-4.20 - 0.49	22°	4.5°	17.5°	13°	-3.85 - 0.17 * 151	-3.87 - 0.25 * 151	-11.80 / -12.00
C	-5.00 - 0.50 * 140°	-13.70 / 14.20	C	C	R	-5.00 - 0.50 * 140°	-4.93 - 0.48	22°	4.5°	17.5°	13°	-4.40 - 0.37 * 21	-4.37 - 0.37 * 21	-12.30 / -12.60

NOTE: 1 Panoscopic Tilt may be effected by decentration &/or front base curve
No tilt angle inserted in the OptiCampus program is taken as zero (0°) degrees of tilt

When no wrap angle is entered the OptiCampus software considers the angle as zero,
Instead of zero I've entered what I consider as a minimum wrap of 8° to 12°

NOTE: 2 Resultant Rx powers have been rounded up/down to reflect that which is
commonly practiced in an optical laboratory - reflected in "surfacing curves"
column above.

NOTE: 3 Refraction vs Worn vertex distances accounted for using
13mm refracted & 10mm wear wrap frame distance

NOTE: 4 For explanation of "Neutralizing" angle see drawing - "neutralizing" angle amount
is dependant upon the decentration amount



Surfacing Variances Spherical Poly vs KBco Poly Wrap Solution

Sample Rx's --- Relationship between Wrap / Tilt Specified & Standard Wrap & Tilt

Job #	Using Nominal 8.25 Base (Poly) Spherical Blanks		KBco Lens "F"			Patient's RX	Rx After Vertex Distance Calculations ³	Physical Wrap Angle ¹	Neutral. Angle ⁴	Effective Wrap Angle	Tilt Angle ¹	Rx After Warp & Tilt Calculations	Wrap Solution (Poly)	
	Rx Power to Surface	Resultant Surf Curves	Series	Job #	R/L Lens								Aspheric Resultant Rx to Surface ²	Nominal 8.25 Base Resultant Surf Curves ²
Column →	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A 1	-3.00 -1.00 * 45°	-11.10 / -12.00	F5	A	R	-3.00 -1.00 * 45°	-2.97 -0.98	22°	4.5°	17.5°	13°	-2.46 -1.32 * 42	-2.50 -1.37 * 42	-10.60 / -11.80
B 2	-2.50 sphere	-10.20 sph	F5	B	L	-2.50 sphere	-2.48 sph	22°	4.5°	17.5°	13°	-2.04 -0.34 * 143	-2.00 -0.37 * 143	-10.20 / -10.50
C 3	-1.00 -2.00 * 90°	-9.30 / -11.10	F4	C	R	-1.00 -2.00 * 90°	-1.00 -1.98	22°	4.5°	17.5°	13°	-0.90 -1.71 * 86	-1.00 -1.75 * 86	-9.30 / -10.90
A 4	+1.25 -1.25 * 180°	-7.30 / -8.40	F2	A	R	+1.25 -1.25 * 180°	+1.25 -1.25	22°	4.5°	17.5°	13°	-1.09 -1.09 * 178	-1.12 -1.12 * 178	-9.30 / -10.30
B 5	+0.50 -2.00 * 45°	-7.60 / 9.60	B	L	L	+0.50 -2.00 * 45°	+0.50 -1.99	22°	4.5°	17.5°	13°	-0.48 -1.71 * 45	-0.50 -1.75 * 45	-8.80 / -10.40
C 6	-1.25 -1.75 * 75°	-9.50 / 11.10	C	R	R	-1.25 -1.75 * 75°	-1.25 -1.73	22°	4.5°	17.5°	13°	-1.08 -1.64 * 70	-1.12 -1.64 * 70	-9.30 / -10.80
A 7	+1.00 -0.75 * 135°	-7.50 / 8.20	F3	A	R	+1.00 -0.75 * 135°	+1.00 -0.75	25°	4.5°	20.5°	8°	+0.95 -0.75 * 134	+1.00 -0.75 * 134	-7.40 / -8.10
B 8	+0.75 -1.25 * 50°	-7.70 / 8.80	B	L	L	+0.75 -1.25 * 50°	+0.75 -1.25	25°	4.5°	20.5°	8°	-0.72 -1.13 * 50	-0.75 -1.12 * 50	-8.90 / 9.90
C 9	+1.50 -0.50 * 45°	-7.10 / 7.60	C	R	R	+1.50 -0.50 * 45°	+1.51 -0.50	25°	4.5°	20.5°	8°	+1.25 -0.29 * 50	+1.25 -0.25 * 50	-7.10 / -7.30
A 10	-1.00 -2.00 * 90°	-9.30 / 11.10	F4	A	R	-1.00 -2.00 * 90°	-1.00 -1.98	25°	4.5°	20.5°	8°	-0.90 -1.70 * 86	-1.00 -1.75 * 86	-9.20 / -10.80
B 11	-1.25 -1.75 * 75°	-9.50 / 11.10	B	L	L	-1.25 -1.75 * 75°	-1.25 -1.73	25°	4.5°	20.5°	8°	-1.17 -1.34 * 79	-1.12 -1.37 * 79	-8.10 / -9.30
C 12	-2.00 sphere	-10.20 sph	C	R	R	-2.00 sphere	-1.98 sph	25°	4.5°	20.5°	8°	-1.64 -0.27 * 37	-1.62 -0.25 * 37	-9.80 / -10.00
A 13	-2.50 sphere	-10.60 sph	F5	A	R	-2.50 sphere	-2.48 sph	22°	4.5°	17.5°	13°	-2.04 -0.34 * 37	-2.00 -0.37 * 37	-10.10 / -10.40
B 14	-3.00 -1.00 * 45°	-11.10 / 12.00	B	L	L	-3.00 -1.00 * 45°	-2.97 -0.98	22°	4.5°	17.5°	13°	-2.46 -1.32 * 42	-2.50 -1.37 * 42	-10.60 / -11.80
C 15	-2.75 -0.25 * 115°	-10.80 / -11.00	C	R	R	-2.75 -0.25 * 115°	-2.73 -0.25	22°	4.5°	17.5°	13°	-2.43 -0.20 * 50	-2.37 -0.25 * 50	-10.50 / -10.70
A 16	-4.25 sphere	-12.20 sph	F6	A	R	-4.25 sphere	-4.20 sph	22°	4.5°	17.5°	13°	-3.45 -0.57 * 37	-3.37 -0.62 * 37	-11.40 / -12.00
B 17	-4.25 -0.50 * 50°	-12.20 / -12.70	B	L	L	-4.25 -0.50 * 50°	-4.20 -0.49	22°	4.5°	17.5°	13°	-3.85 0.17 * 151	-3.87 -0.25 * 151	-11.80 / -12.00
C 18	-5.00 -0.50 * 140°	-12.90 / 13.40	C	R	R	-5.00 -0.50 * 140°	-4.93 -0.48	22°	4.5°	17.5°	13°	-4.40 -0.37 * 21	-4.37 -0.37 * 21	-12.30 / -12.60

NOTE: 1 Panoscopic Tilt may be effected by decentration &/or front base curve
No tilt angle inserted in the OptiCampus program is taken as zero (0°) degrees of tilt

When no wrap angle is entered the OptiCampus software considers the angle as zero,
Instead of zero I've entered what I consider as a minimum wrap of 8° to 12°

NOTE: 2 Resultant Rx powers have been rounded up/down to reflect that which is
commonly practiced in an optical laboratory - reflected in "surfacing curves"
column above.

NOTE: 3 Refraction vs Worn vertex distances accounted for using
13mm refracted & 10mm wear wrap frame distance

NOTE: 4 For explanation of "Neutralizing" angle see drawing - "neutralizing" angle amount
is dependant upon the decentration amount

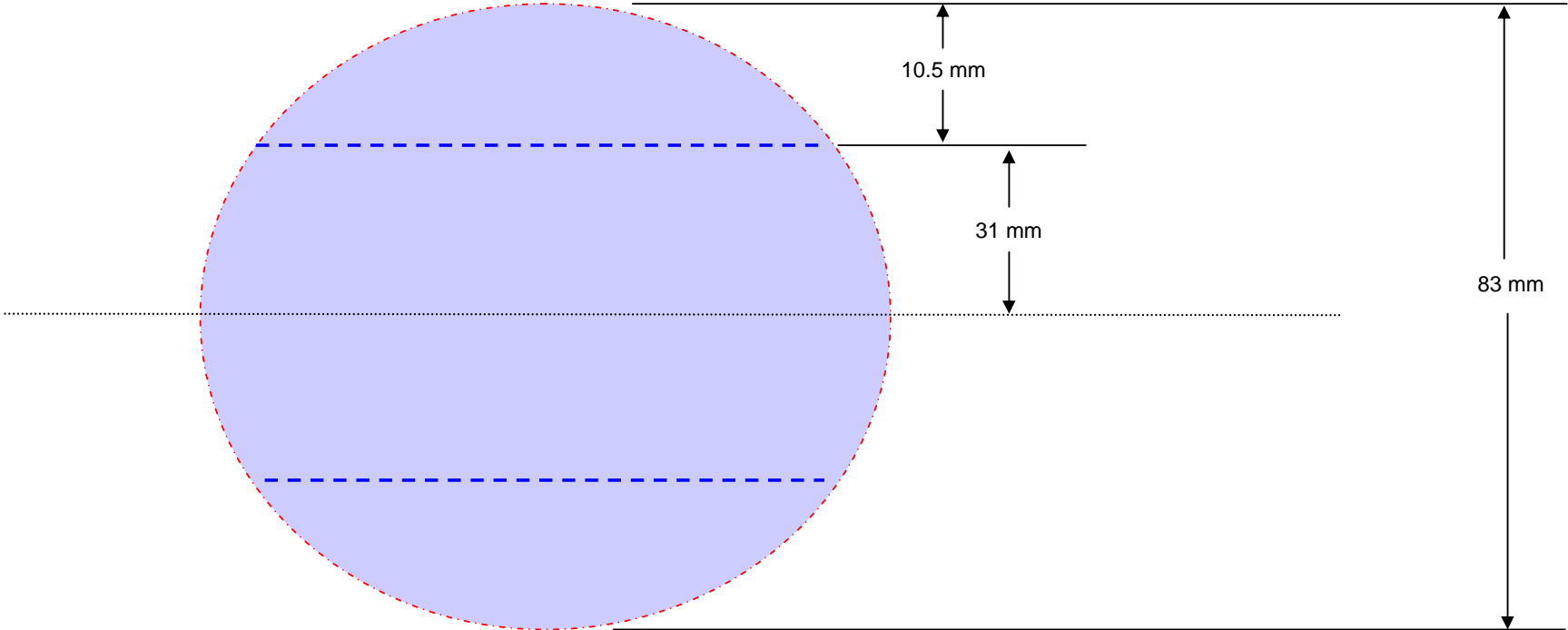
KBCO EOS - Base 8 WRAP – Prescription chart

	Cylinder (-)																
Sphere	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
2.50																	
2.25																	
2.00																	
1.75																	
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-3.00																	
-3.25																	
-3.50																	
-3.75																	
-4.00																	
-4.25																	
-4.50																	

The maximum Minus meridian is -6.00[D]

Cribbed Blank - or - Crib to Shape Concept

Pattern #1



Cribbed Blank - or - Crib to Shape Concept

Pattern #2

