

# Optical Dispensing Standards

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## A great place with great people



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## Overview

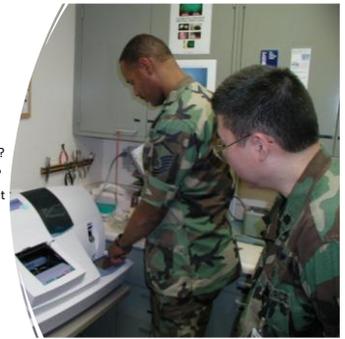
- Importance of Standards
- ANSI Z80
- ANSI Z87
- Verification
- Measurements
- Fitting/Adjustments



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## Questions

- Who works with a surfacing lab on site?
- Who works with a finishing lab on site?
- How many of you understand that what happens in the dispensary impacts the lab and final product?



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## Questions

- Who is willing to share an interesting dispensing story?
- Who is willing to share an interesting fitting story?
- Who is willing to share an interesting adjusting story?



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## Good Customer Service

- Placing Orders
- Checking on orders status
- Product Availability
- Notifying of delays
- Promotional Information
- Life-Style Dispensing



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### Standards are reference points

- something considered by an authority or by general consent as a basis of comparison; an approved model
- an object that is regarded as the usual or most common size or form of its kind
- a rule or principle that is used as a basis for judgment
- an average or normal requirement, quality, quantity, level, grade, etc.
- You should be familiar with industry standards or where to find them!

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### Importance of Standards



- Prevents substandard care
- Gives guidelines and parameters that protect patients
- Standardize industry guidelines
- Guidelines aid in dispensary's and labs

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### Frame Alignment is the Beginning

"Truing the frame", "bench alignment" or "standard alignment".

Same routine on every frame/ both plastic and metal frames.

Alignment ensures that you always start from the same place when fitting or adjusting

Enables quick adjustments

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### Most Common Four Point Touch Test

- This is probably the most useful test.
- After you have performed the "four point touch" test / "frame tap dancing"



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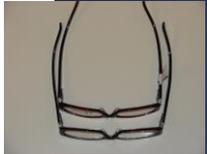
### Procedure

- Examine the alignment and properties of a frame from these views:
  - Front view
  - View from above
  - Side view
  - View from below
  - Back view
  - 90-degree bend on temples
  - Temple folds

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### Where to begin?

- Observe the glasses
- Frame front
- Splay
- Nose pieces
- Temples
- Observe the patient... this sometimes is the problem



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## Adjustments

- Ensure:
- 4-point check
- Proper fit
- Proper alignment
- Comfort
- Appearance
- Patient satisfaction



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## Definitions

- **Index of Refraction:**
  - The speed in which light passes through a medium
  - The higher the index of refraction, the thinner the material
- **Specific Gravity:**
  - This is the measurement of density or weight of the material, expressed in grams/ cm<sup>3</sup> (cubic centimeter).
  - Lenses that are light weight will be more comfortable to wear. Consider fitting patients with a LOW specific gravity for comfort.
- **Abbe Value:**
  - The Abbe number is the inverse (or reciprocal) of a material's chromatic dispersion. So for example, polycarbonate has a high degree of chromatic dispersion, it has a very low Abbe number.
- **Fitting:**
  - The dispensing of a new pair of eyewear.
- **Adjustments:**
  - The modification or alteration of the patient's current eyewear.

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## ANSI Z80.1 Dress Frames

- Vertical segments 1mm
- Horizontal segs 2.5mm
- Base Curve  $\pm 0.75D$
- Horizontal Prism 0.67D
- Vertical prism 0.33D
- Add Power
  - +0.75 to +4.00  $\pm 0.12D$
  - +4.25 and above  $\pm 0.25D$
- Cylinder Power
  - -0.25  $\pm 7\%$
  - -0.50 or -0.75  $\pm 5\%$
  - -1.00, -1.25, -1.50  $\pm 3\%$
  - -1.75 and more  $\pm 2\%$

Is there a separate set of rules for PALs?

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## ANSI Z87 Safety Standards

- Safety standards
- Minimal center of thickness will depend on the material being used



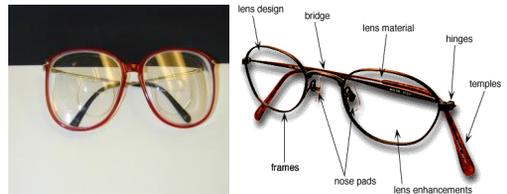
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## Measurements

- Rx Verification
  - Material verification
  - PD parameters
- Prism verification
- Add Power
- BC Measurements
  - Jewel tip
  - Elderly patients
- Polariscope
  - Stress
  - Heat treatment
  - Caliper



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"A Poor Fitting Frame Is As Bad As Having the Wrong Rx."

Dr. R.E. Bruce

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### Take monocular PD's

Explain purpose of the measurement

Both Far & Near

Recorded properly order form



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### Select and Pre-Adjust new frame to patient's face

- Truing the frame is essential
- Place frame on patient's face in proper position
- Increase pantoscopic tilt
- Have patient check fit (this is critical)



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### Mark OC/ht for New Frame/Progressive Lens on patient

Check pantoscopic tilt

Closes eye to dot (parallax error)

Record Properly on Rx form

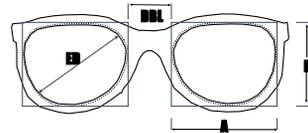
Critical measurement for correct alignment



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### Frame Measurements

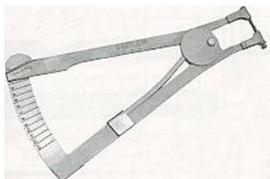
- The BOXING System
  - A = horizontal
  - B = vertical
  - DBL
  - ED = longest
- Frame size
- Front, Bridge, Temples



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### Lens Caliper

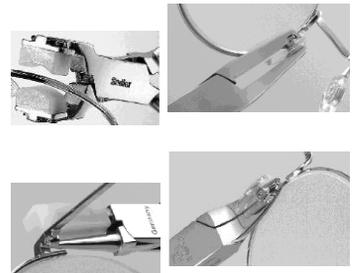
Measures lens thickness



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### The Adjustment

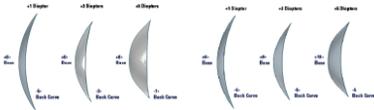
There are several indispensable tools for frame adjustments...use the correct tool for the correct job to get the best result



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## Lenses

- Lens Shapes
  - Various Configurations give same power
  - How to handle the Base Curve dilemma



- Base Curve Selection Charts provide the proper base curve for each power in the product range

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## What is warpage and how is it measured?

- Warpage is: when the lens is cut too large for the frame creating distortion in the optics of the lens
- It is measure on the front surface of the lens with a Polariscope or lens clock



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## Warpage

- What is warpage
- How is warpage checked?
- When is warpage checked?
- What is the tolerance for warpage?
- Look for the pressure points



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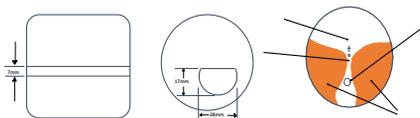
## Manual Lensometer

- Turn the power on ☺
- Focus the eye piece... absolutely critical
- Table adjustment
- FPD...center of lens in the frame
- [SVD](#)
- [Bifocals](#)
- Record everything in the correct place
- Make sure you inspect for prism

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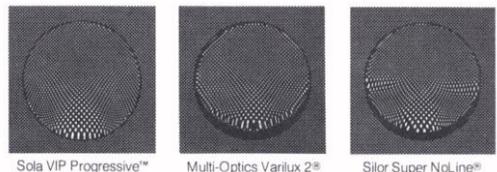
## Multifocals

- A lens that has more than one focus distance
  - Fused multifocal
  - One-piece multifocal



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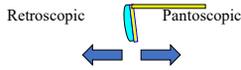
## Progressive Add Lenses (PAL)



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### Optimum Lens performance adjustment

- Panto/ Retro angle is an independent movement from the fold angle adjustment
  - Adjust with temple open/ 90-95 degrees from the front.

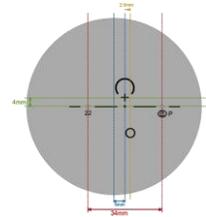


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### The Prescription

Verify that the lenses are accurate with respect to the order...

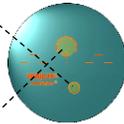
- Distance Vision
  - Sphere
  - Cylinder
  - Axis
- Prism
- Near Vision



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### The Prescription

Although a lot of "focus" is placed on the PAL's ADD...



...the distance Rx is where it all starts- and so should you!

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### Fitting Strategy

Consider what each of the following lenses attempt to provide:

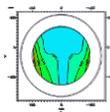
NVO readers

Flat-top Bifocals

Flat-top Trifocals

Early PAL lenses

Modern Progressives

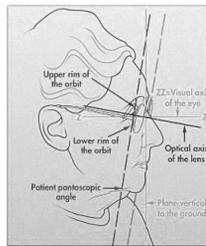


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### The Fit

Areas to investigate...

- Measurements
  - Monocular PDs
  - Fitting Height
- Vertex Distance
- Pantoscopic / Face Form



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### Fitting Strategy

Modern PAL designs demand adherence to proper fitting techniques. In fact, proper fitting is of greater importance in modern designs. Why?

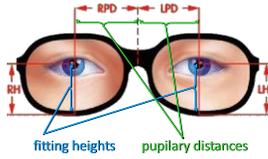
- PALs are "doing more" than they once did
- Progressions are becoming shorter
- Designs/lenses are becoming more expensive!



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### The Fit

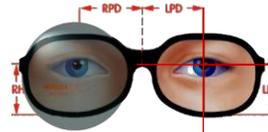
Most PAL "non-adapts" (and patient complaints) are caused by inaccurate measurements...



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### The Fit

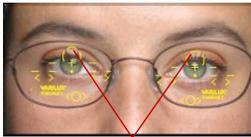
Placement of the Fitting Reference Point (FRP) is crucial to the visual comfort and function of a PAL...



...with very few exceptions, the FRP should be placed at the corneal reflex

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### The Fit



Align a remarking tape with the PAL identification marks and verify that the FRP is central pupil...

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### Don't Be That Optician!

Thank you, Jerry Hines  
Zeiss



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### The Adjustment

Incorrect pantoscopic tilt creates unwanted astigmatism throughout the lens...

+2° tilt = -1mm height  
-2° tilt = +1mm height



...the tilt also affects the perceived height of the progression

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### Troubleshooting

She's just arrived to pick up her brand new, progressive, high-index, AR coated, photochromic, \$780 lenses...



...a moment passes, followed by those three special words...

"I can't see!"

...time for a little troubleshooting!

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## Troubleshooting

The patient complains "I can't see..."



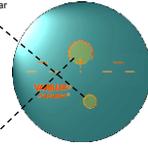
"Are you having difficulty with near vision, distance vision, or both?"

The patient responds "Both..."

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## Troubleshooting

The patient is telling you that the glasses are totally out of alignment both the distance and near

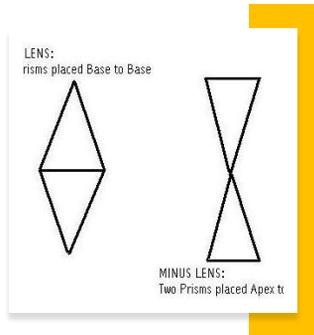


...the distance Rx is where it all starts- and so should you!

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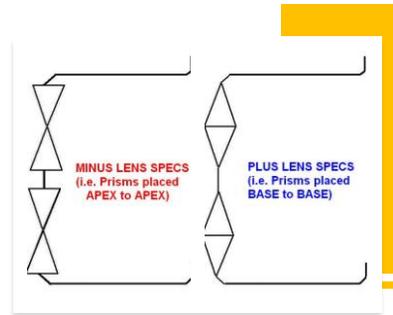
### Identifying Wanted & Unwanted Prism (cont.)

- All spectacles lenses can be thought of as... **two prisms put together**



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### Identifying Wanted & Unwanted Prism (cont.)



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### Identifying Wanted & Unwanted Prism (cont.)

Light passing thru the **OPTICAL CENTER (OC)** of a lens is **NOT** deviated.

So, to avoid **UNWANTED PRISM**, the:

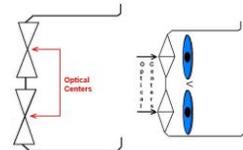
- Optician needs to **measure** the patient's pupillary distance (**PD**) **accurately**

**AND**

- Fabrication lab needs to make the specs so the **optical centers (OCs)** **match** the patient's **PD**.

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### Identifying Wanted & Unwanted Prism (cont.)



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Identifying Wanted & Unwanted Prism (cont.)

- In a **perfect world**: All eyes would line up perfectly (heterophoria) & no spectacles would ever need prism in them.
- In a **perfect world**: Every optician would measure every patient's PD accurately.
- In a **perfect world**: Every lab would make the optical centers (OCs) of every pair of spectacles line up with the patient's PD so the patient always looked through the OCs of the lenses.
- Finally, in a **perfect world**: All glasses would be fit to the patient exactly right.

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Identifying Wanted & Unwanted Prism (cont.)

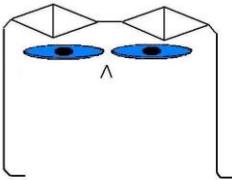
**SNAP OUT OF IT!**

**"Perfect World" doesn't exist**

- Patient's eyes are not perfectly aligned (i.e., they have phorias or tropias), so some people will need prism to see clearly & without diplopia.
- Some opticians will mismeasure the patient's PD **or** write it down wrong (or illegibly.)
- Some labs will fail to make specs correctly, e.g., to the specifications given them.
- Some opticians will do a poor job of adjusting specs to sit properly on the patient.

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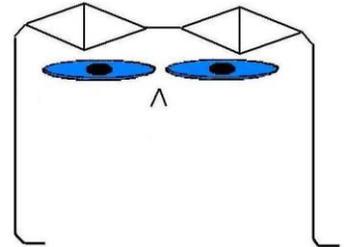
Identifying Wanted & Unwanted Prism (cont.)



- What kind of **UNWANTED** prism is being 'induced' here?
- (Base **IN** or Base **OUT**?)

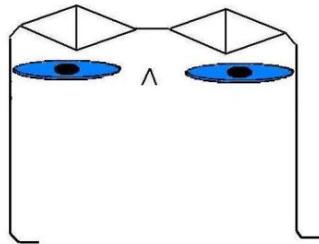
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BASE OUT  
(each eye)



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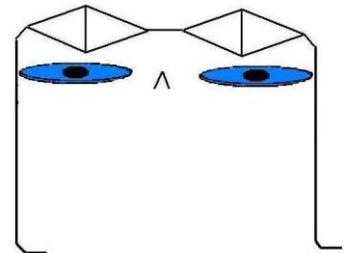
Identifying Wanted & Unwanted Prism (cont.)



- What kind of **UNWANTED** prism is being 'induced' here?
- (Base **IN** or Base **OUT**?)

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BASE IN  
(each eye)



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## The Prescription



The patient complains "I can't see..."

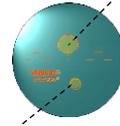
"Are you having difficulty with near vision, distance vision, or both?"

The patient responds "just near..."

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## The Prescription

The patient is telling you the distance is "okay..."

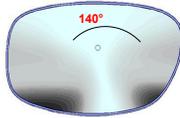


...so verify the ADD power is appropriate!

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## Measuring a PAL Axis

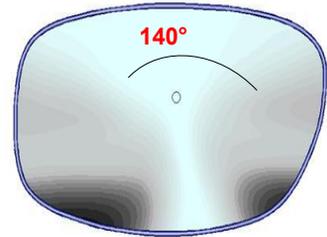
Allow for more axis tolerance ANSI Z80.1-2005	tolerance	± 14
	0.375 - 0.50	± 7
	>0.50 - ≤ 0.75	± 5
	> 0.75 - ≤ 1.50	± 3
	> 1.50	± 2



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## Ellipse – Widest Distance Vision

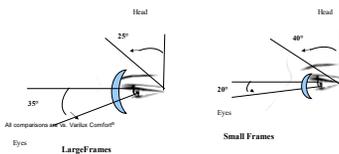
- The widest distance vision in short corridor progressives
- Wide, comfortable vision that functions intuitively



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## Ellipse - Full Near Vision

- Near vision is reached easily and quickly by the wearer
- 85% of power achieved at only 9.5 mm
- A natural downward eye movement allows natural viewing



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## Troubleshooting

Verify/adjust in this order...

- Order Accuracy
- Rx Accuracy
  - Distance Rx
  - Near Rx
- Fitting Measurements
  - Monocular PDs
  - Fitting Heights
- Frame Adjustment
  - Pantoscopic Tilt
  - Vertex Distance



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### Troubleshooting

If difficulty persists, consider the PAL design...

- Type of Design
  - Channel Designed
  - Global Designed
  - Design Characteristics
    - Soft vs. Hard
    - Sphere Slopes
    - Zone widths
- Progression Length
  - Linear vs. Weighted



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### Considerations for choosing the proper material:

Protection:

- All children under 18 should have polycarbonate or Trivex, which is a new product described below
- Athletes should wear polycarbonate or Trivex
- Rec - Specs can only be ordered with polycarbonate or Trivex
- All eyewear should be sold with a UV shield, which protects the eye from the early onset of cataracts. (primarily cortical cataracts)
- Safety lenses & frames must be stamped Z87 (lenses must be made the proper minimum thickness of 3.0 mm)

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### Material Characteristics

- Glass
  - Best optics/heavy
- CR-39 (plastic)
  - Columbia resin #39
- Polycarbonate
  - GE labs Gentex
- Trivex

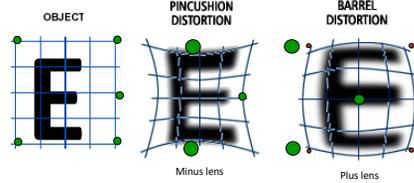


polycarbonate

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### Lenses & Aberrations

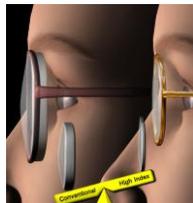
...the resultant magnification or minification in the lens periphery causes distortion



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### Key definitions to remember?

- Abbe value... is a number given to describe the amount of chromatic aberration of an ophthalmic lens material. The higher the Abbe Value, the lower the number.
- Specific Gravity... density of the material (basically the weight) the heavier the material the greater it's specific density
- Index of refraction... speed in which light passes through a material...these lenses have less chromatic aberration
- Chromatic Aberration... color distortion created by the material composition
- Aspheric lens... flatter than normal lens



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### High index glass

- The 1st introduced was 1.60 index: can have a 1.5 mm CT
- High index glass now available in 1.60, 1.70, 1.80, and with a waiver, 1.90.
- High index glass has a higher specific gravity, so their is no noticeable weight reduction between regular glass and high index, even though it is thinner.

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## CR39 = Plastic = generic: Hard Resin

- The most popular lens choice today
- Can be as thin as 1.1 mm in a "stock lens" form
- Many companies feature their toughest plastic scratch resistant coat over a CR-39 matrix for a "super tough" scratch coating. Most notable is Essilor's TD-2, and Zeiss' Foundation.

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## High Index Plastic = generic: High Index Resin

- Range in index from 1.54 - 1.71
- 1.54 index = trade name: Spectralite, by Sola, is at the beginning range of what is considered "mid index" but remains a popular lens choice among opticians. Many lenses with aspheric designs are made of High Index Resin.
- The thinnest possible combination would be 1.70 index with an aspheric design for both myopes and hyperopes. The 1.70 material is made only by Hoya Optical.

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## Polycarbonate: std index 1.59



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## Polycarbonate, con't.

- Tinting is somewhat difficult on finished polycarbonate lenses because of the extra hard scratch coating on both surfaces. (All lenses with such a coating are tough to tint but it is not possible to tint an uncoated poly lens)
- Can be surfaced to a center thickness of 1.0 mm, and still pass the FDA drop ball test

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## Polycarbonate, con't.

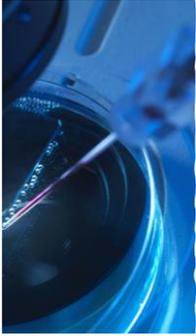
- Has a very high impact resistance equaled only by Trivex, and is widely used in sports- and sun-wear, as well as many other non-ophthalmic products.
- Has an Abbe value of approximately 31, which means it has high chromatic dispersion:
  - this is demonstrated by the fact that many patients will tell you they see colors at the periphery of viewed objects. Although not a general rule, this seems to happen more frequently in high hyperopes, high myopes, and high astigmats.

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## Polycarbonate, con't.

- This material you should STRONGLY recommend to anyone under the age of 18.
  - Most retail optical chains will not sell a child anything but polycarbonate. (Some medical insurance plans will charge extra for polycarbonate. At Pacific we charge no premium for this material even though it is more expensive).
- The lens of choice for sports, i.e. Rec-specs.
- Can be ground to a 1.0 mm CT, therefore usually thinner than high index resin (1.0 NOT FOR SAFETY OR SPORTS! 3.0 mm is still the minimum for these applications).
- Polycarbonate is available in photochromatic and polarized forms.

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## Coatings

### Scratch protection

- Most modern lenses include scratch protection at no additional cost. Most progressives, aspherics, high index, polycarbonate, Transitions and Trivex have scratch protection applied immediately after the lens is cast or molded and cure at the same time the lens does.

## UV protection / coating

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Most consumers are now aware that UV is very damaging to their skin as well as the eyes.



Most 'over the counter' sunwear now contain UV protection.



Since the least expensive eyewear include UV protection, all the products you present should include a UV filter!

## Anti-reflection coatings

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Most modern A/R coatings are multi-layered (usually a minimum of 5 layers.)



After coating the lenses transmit 99.5 % of visible light



AR coatings are ultra thin and measured in angstroms



AR coatings make the lenses much more cosmetically attractive



Recommend A/R to anyone who has high public visibility or works under fluorescent lights.

## Anti-reflection coatings cont.

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Patients see better with A/R lenses because the lenses have better optical properties.

- Contrast sensitivity is increased with AR lenses

A/R lenses significantly enhance night driving.

A/R is recommended on all prescriptions because it reduces "ghost images" due to reflections from the internal lens surfaces.

Use caution in suggesting A/R in very dusty, oily or abusive applications.

## Anti-reflection coatings cont.

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A/R coatings were once difficult to keep clean, making the appearance of oils on the surface noticeable. However, today's A/R coatings have an additional final layer of silicone over the top of the A/R layer. The silicone layer is smooth, flexible, microscopically thin and hydrophobic, and doesn't interfere with the light transmission. Debris can be removed with a soft cotton cloth, or a micro-fiber cleaning cloth.

The most recent coatings are more scratch resistant and resist water and smudging.

## Cleaning A/R lenses

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Liquid soap and water is the best method. Use four steps: rinse, wash, rinse, dry. Minimize pressure on the lens.



Avoid soaps with moisturizers or creams.



Avoid abrasive soaps.



The best cleaner is any liquid detergent which has no additives (shampoo, liquid hand soap, dishwashing fluid).



Avoid: Windex, Acetone, hair spray, or caustic solutions



Avoid: putting lenses into ultrasonic cleaners

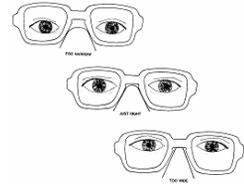
## Pulse Check for Inspection Areas

- Current license (check state requirements)
- All personnel certified
- Peer Review in place and current
- Signage current and in place
- Fees for service posted and current
- Monthly meetings with MTF
- Patient surveys current (Apr & Nov for most)
- Routine patient access (does not exceed 5 working days)
- Outstanding appearance (no hand-written or taped signs...)
- Contract awareness (working copy in clinic)
- General house keeping
- Ten (or fewer) "holes" in frame board
- Current and posted license and/or ABO certification
- Current prices and packages
- Meets standards during optometry (spectacle) review
- Clean demo lenses (no bifocal fitting marks...)
- Clean nosepads (especially mature ladies frames)
- Working copy of the contract available for reference
- Patient surveys current (Apr & Nov for most)
- Monthly meetings with staff
- As always, contact me or my team with questions, comment, and/or recommendations

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## Fitting Check

- The Prescription
  - Distance Rx Verification
  - Near Rx Verification
- The Fit
  - Measurements
    - Pupillary Distance
    - Height
  - The Adjustment
    - Vertex Distance
    - Pantoscopic Tilt/Faceform
- The Design

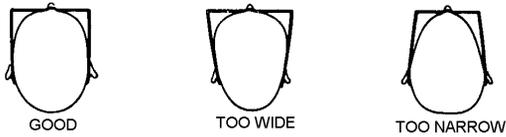


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### Temple Fit



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### PD Measurements



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## Frame Adjustments

- **Step 1: Frame front**
- Check for rolling of the eyewire. If needed remove the lenses and straighten the eyewires. Use the frame warmer for plastic lenses. Make sure the bevel is straight and will hold the lenses. In the case of rimless frames, make sure the nylon cord is tight enough to hold the lenses in place.
- The frame front should be straight and not twisted like a propeller blade. To check this, hold the spectacles perpendicular to the floor and look along the lenses, look to see if the bottom edges of the frame align with the top edges. If the frame is twisted, then you must straighten it out. Twist the frame at the bridge after heating it in the frame warmer.
- Check to see the frame front is slightly curved toward the patient's face, from the bridge to each endpiece. This is called faceform.

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## Frame Adjustments Cont

- **Step 2: Bridge/nose pads**
- The tops of the pads should be closer together than the bottoms.
- The nosepads should follow the shape of the eyewire.
- The pads should slope back slightly.
- With some patients the nose pads will irritate or dig into their skin. If adjustments do not work, there are a couple of other ideas you can try. If the frames do not have adjustable nose pads you can add them. If the patient does not want adjustable nose pads, you can apply press-on silicone nose pads on the bridge. This redistributes the weight of the frame and adds a cushion for the nose. If the spectacles have adjustable nose pads, you can replace the current pads with oversized nose pads. Again, this redistributes more of the weight and adds a larger cushion. Silicone is the best choice as it adds a breathability factor needed for healthy skin.

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## Frame Adjustments

### • Step 3: Temples

- Check the horizontal alignment of the temples. Lay the spectacles upside-down on a flat surface. In this position, the frame should touch the flat surface in four places. The frame should balance at two places on the eyewire and also at the bends in the temple (this is known as four-point balance). On plastic frames use heat prior to bending the temples. Be careful when bending the temples. You do not want to loosen the hinge.
- If the endpieces are straight, but the temples are still not even, the problem is the hinges. You will have to bend them back into alignment. No heat is required as the hinges are metal.
- The temples should be parallel to each other as viewed from above. If a temple isn't opening wide enough, file some material off of the butt end of the temple (be very careful and use a fine file). If a temple is sticking out too far, warm it in the warming pan and then while holding it with the endpiece gripping pliers near the hinge, bend the temple inward. Do not use heat for metal frames; you will just bend as needed. Ideally, you want the temples to meet the frame front at a 90° angle. If the left and right side are not equal, the frames will sit cockeyed on the patient's face.

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## Adjustments cont...

- Now, fold the frame. The temples should fold evenly across the frame front and touch the bottom of the eyewire, not the lenses. The hinge may need rotating if the temples rub the lens. Remember, all hinge bends are done cold.
- Properly aligning the frames will lead to a "feel good" fit for the patient. Your final adjustments and dispensing will be much easier.

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PROBLEM	LENSOMETER	LENS CLOCK	PD STICK
Verify Rx			
Frame adjust			
Verify OC centers			
PD			
Seg Hts			
Vertex Distance			
Coatings			
Lens design			
Prism			
Warnings			

Position on the face

### Troubleshooting

- Verify the chart
- Verify SRx from provider
- Neutralized the glasses
- Use the troubleshooting guide
- 4-point stance
- Facial contact points
- Lens material
- Lens coatings
- Photochromatic/mirrors/etc.
- PPD and FPD ... prismatic effect

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### Pete Hanlin – Educate the patient



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## ANSI Z80.1

- This must be displayed and staff must be familiar with the basic concepts and procedures required in dispensing



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## ANSI Standards

ANSI Standards are established as manufacturing guidelines, and represent tolerances for the production of prescription eyewear regarding...



- sphere, cylinder, total, & add power
- cylinder axis
- location of optical center & segments
- lens geometry (if specified)

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## ANSI Z80.1 standards

As a paraoptometric working with various types of eyewear, you should be familiar with the American National Standards Institute (ANSI) Z80.1 standards. The organization is a nonprofit institute composed of representatives from manufacturers, professional organizations, scientific and consumer groups, and government agencies. It serves as a coordinating body in setting national standards, which serve as a guide to help manufacturers, consumers, and the public ensure accurate products are made.



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## References

- [www.ansi.com](http://www.ansi.com)
- [www.transitions.com](http://www.transitions.com)
- [www.essilor.com](http://www.essilor.com)
- [www.sola.com](http://www.sola.com)
- Optical Laboratories Association, "Perspective on Lenses", 1999
- Frames Product Guide: Lenses (see: [www.framesdata.com](http://www.framesdata.com)) 1999 "Lens Trends"



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Thank you

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