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MONOFOCAL IOLs
PRODUCT PRESENTATION

ALSIOL

ALSIOL VF

ALSAFIT

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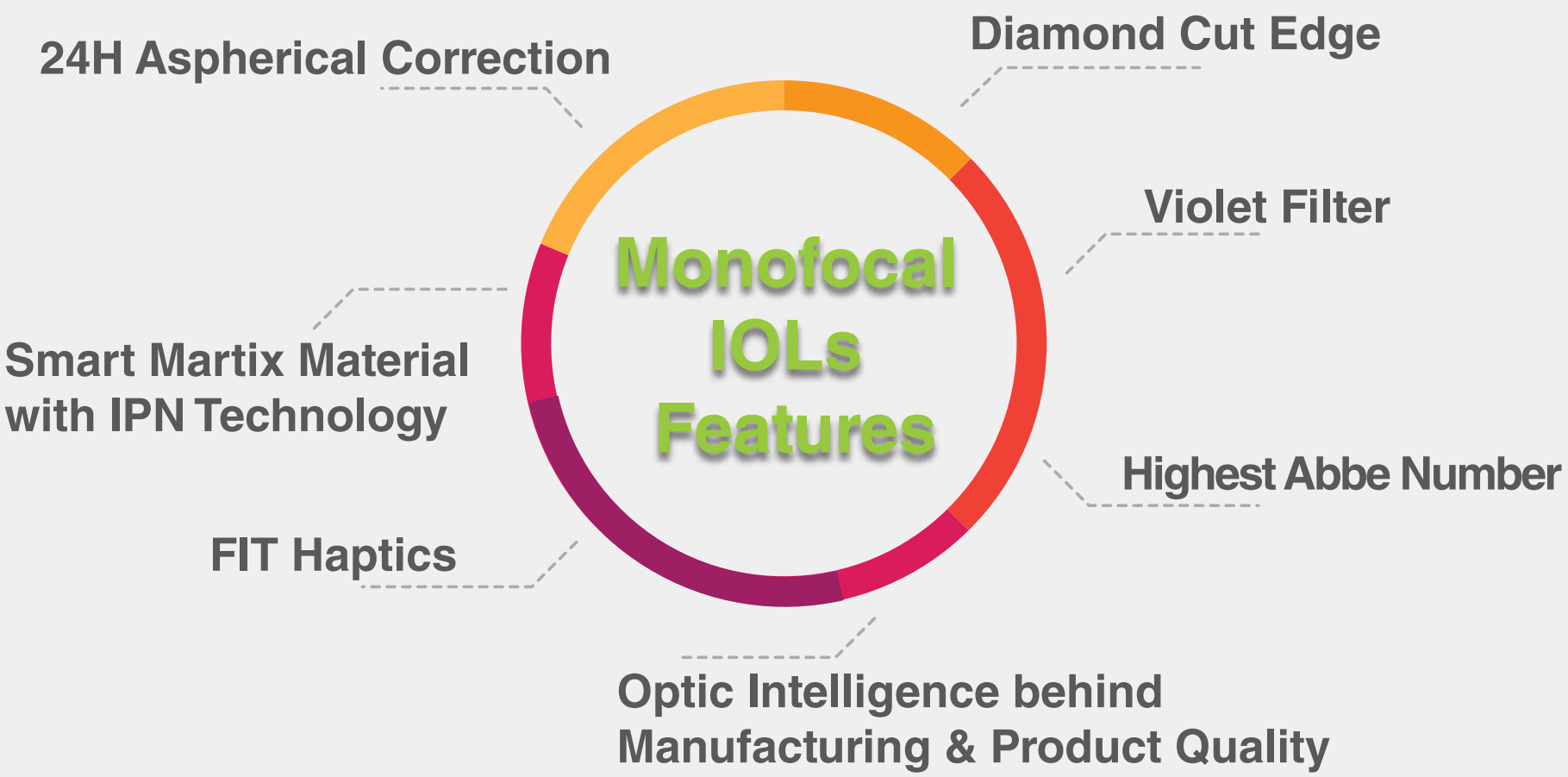
ALSIOL | ALSIOL VF | ALSAFIT



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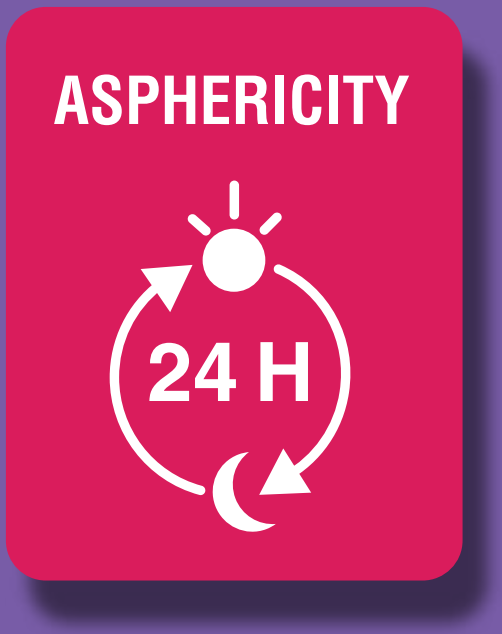
24H
Aspherical Correction



ASPHERICITY
24 H

Depth of focus
Day light

Contrast sensitivity
Twilight

Light scattering control
Night

ASPHERICITY
24 H

Definition of Sphericity & Asphericity

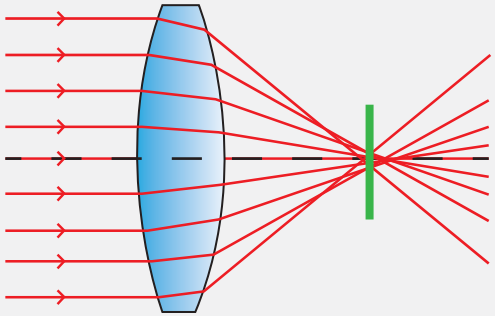
SPHERICAL ABERRATION

- When parallel rays pass through the spherical surface, the **central rays** focus on more posteriorly while peripheral rays focus progressively more anterior.

- "Positive" spherical aberration means **peripheral rays** are **bent too much.**

- Specially at dim night conditions, **Spherical aberrations increase** as a result of expanded puppil size

Lens with
Spherical Aberration

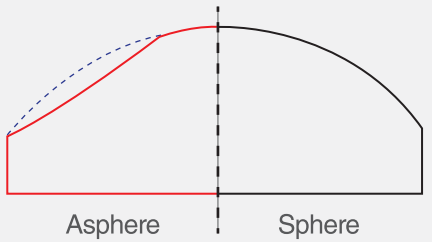


ASPHERICITY
24 H

Why Aspheric Correction is so crucial?

- Without aspherical correction on IOL, Aberration causes defocusing of improper refracted lights.

- Total spherical aberrations will result
  - Astigmatism-like aberration
  - Light scatterings in mesopic conditions

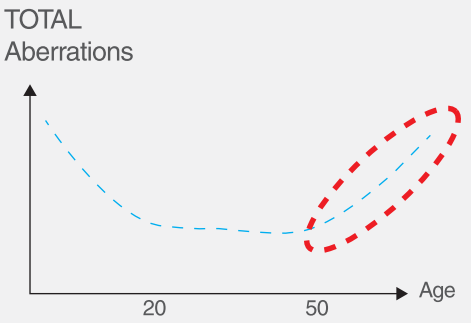


ASPHERICITY
24 H

Spherical Aberration Changes in life time period

- In healty human eye, cornea and crystalline lens have their own spheric aberrations which naturally starts and continue to change from young ages to older ages .

- Consequently both cornea and crystalline lens aberrations effects and determines total **spheric aberrations** in life time period.



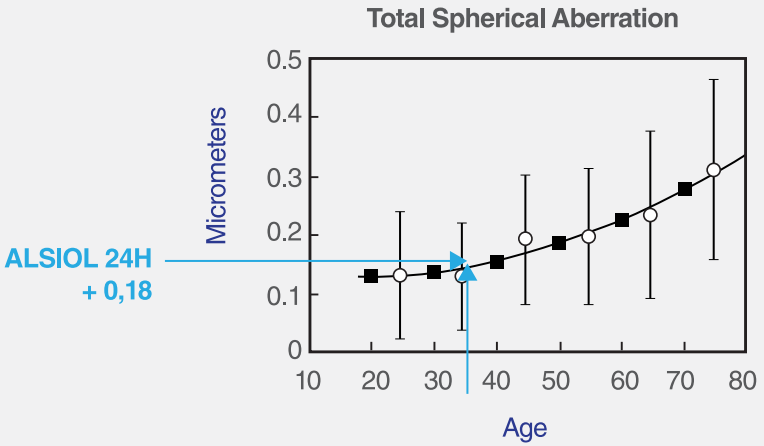
Brunette et al, 2003, IOVS

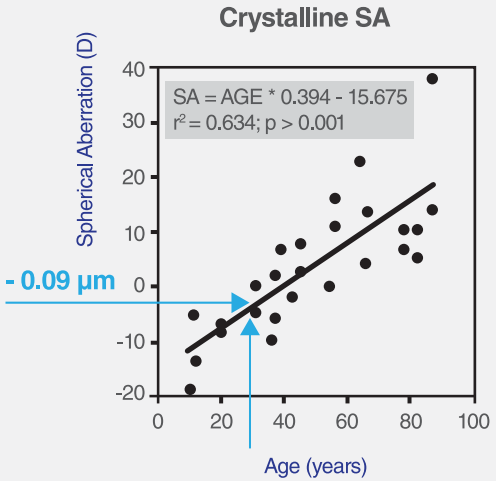
Recent studies of simultaneous measurements of corneal and ocular aberrations in normal eyes showed that there is a natural compensation of the spherical aberration (SA) between the cornea and lens for young subjects. Normal aging tends to disrupt this compensation mechanism because the SA of the lens gradually changes from negative to positive.

ASPHERICITY
24 H

Balance of corneal and internal SA Averagely remains +0.1 µm SA to have depth of focus in between 20s to 40

Balance between corneal and internal SA remains aprx. 0.1µm which stays constant in between ages 20s to 40.*





*Adaptive model of the aging emmetropic eye and its changes with accommodation. Rafael Navarro Journal of Vision (2014) 14(13):21, 1–17

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ASPHERICITY 24 H

Residual SA Comperison

Aspherical IOLs

Spherical IOLs

24H Aspherical Correction

	Tecnis 1	Acrysof	AlsiOL-AlsaFIT	Zeiss CT ASPHINA 509M	Akreos	Softec HD	enVista	Spherical IOL
Aberration correction of lens	-0.27 µm	-0.20 µm	-0.09 µm	0	0	0	0	+0.15
Residual aberration of eye	0	0.07 µm	0.18 µm	0.27 µm	0.27 µm	0.27 µm	0.27 µm	0.42 µm

Strong (-) Aspherical IOLs — Mild (-) Aspherical — Neutral Aspherical IOLs

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ASPHERICITY
24 H

Expectations & SA correction Comparison	Spherical IOLs	Neutral Aspherical IOLs	Well known Strong (-) Aspherical IOLs	ALSIOL 24H Aspherical Correction
Astigmatism like aberration control	-	+	+	+
Light scatterings and blurred vision control in mezopic conditions	-	-	+	+
Contrast sensitivity at dimlight	-	-	-	+
Decentralization tolerance	-	+	-	+
Depth of focus	-	+	-	+
Leaving a weak spherical value about +0.1 µm as the young eye behaves	-	-	-	+
Focus Profile	Defocus	Defocus	NO longitudinal Focus Narrow focus	Longitudinal focus as young eye

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ASPHERICITY
24 H

Provides Deeper depth of focus vision at day & night

Leaves weak spherical value about +0.1 µm as the young adaptive eye behaves

Poor depth of focus

Deeper depth of focus

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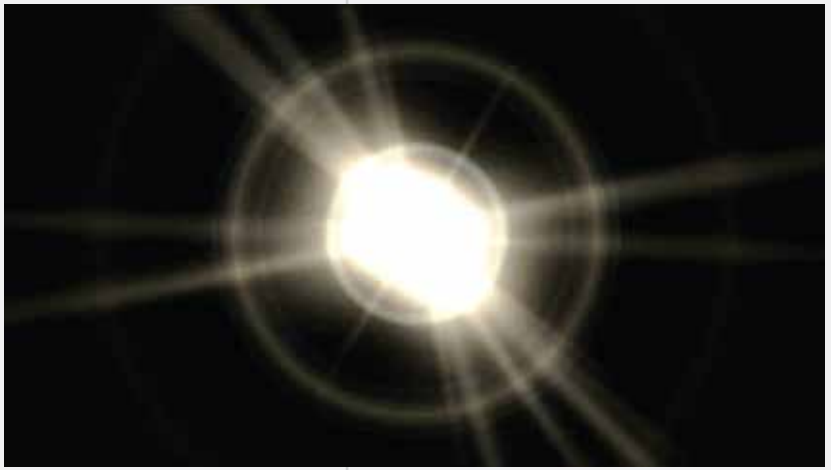
ASPHERICITY
24 H

Thanks to 24H asphericity, Alsanza IOLs control:

Light scatterings, glare and halos at
twilight & night



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ASPHERICITY
24 H

Light efficiency improves contrast sensitivity at
day and night

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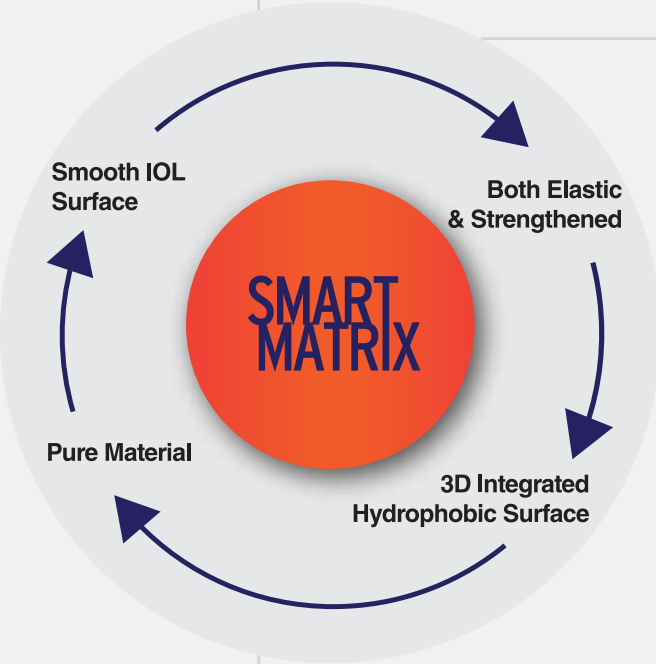
Smart Matrix Material
with IPN technology

MATERIAL

SMART MATRIX

What is Smart Matrix Material?

• Smart Matrix material with IPN technology is unique combination of 2- Hydroxyethylmethacrylate and 2- Oxyethylmethacrylate special monomers both yielding **4 significant features at same time**



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MATERIAL
SMART MATRIX

What is IPN technology?
Interpenetrating Polymer Network

Smart Martix with IPN technology carries 2 different chemical identities simultaneously providing best features of two **IPN (Interpenetrating Polymer Network) technology builds** Ultra Pure monomers with understroyable connections in **3 Dimentional** structure.That creats a strength polymer network protecting IOL from deformation, delamination or dispersion

2-Hydroxyethylmethacrylate
Hydrophilic

Oxyethylmethacrylate
Hydrophobic

Smart Matrix with IPN technology

MATERIAL

SMART MATRIX

1- Both Elastic & Strengthened Material

Smart Matrix Material with IPN technology serves 2 different chemical identities with providing different advantages of two

Expansion	
Linear	1.125
Radial	1.125
Telsile g/mm^2	33
Young's Modulus g/mm^2	62

ALSIOLs can expand up to 1.125 times more then its original form linearly and radialy

Tensile Strength: ALSIOL can resist stress about 33g/mm^2 without any deformation during all procedure

Young's module: Elasticity module

MATERIAL

SMART MATRIX

1- Both Elastic & Strengthened Material

- **High Elasticity module** provides IOL folding-inserting and most significantly return ability to its original shape and optical performance in the most desirable time frame

- **High tensile Stregnth** provides IOL **resist against external** stresses while going through injector to capsular bag in order to prevent any damage on its haptics or optic zone

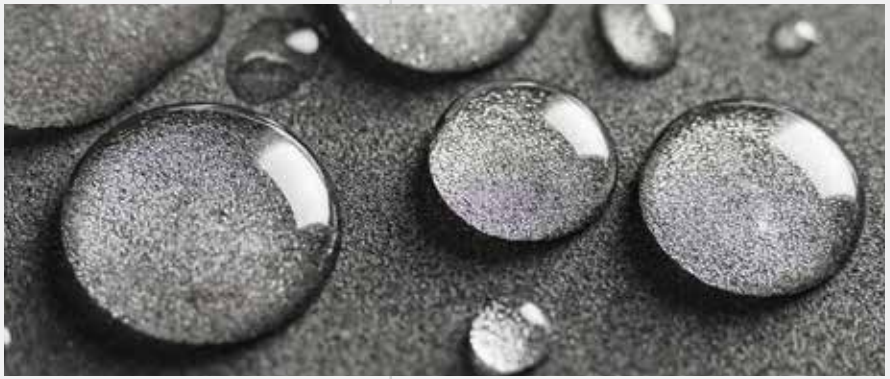
MATERIAL

SMART MATRIX

2- 3D integrated Hydrophobic Surface

Thanks to IPN technology, IOL's Smart Matrix material has Hydrophobic surface with undestroyable connections

- Increases fibronectin adhesion
- Lowers affinity to Lens Epithelial Cells (LECs)
- Reduces the risk of PCO



MATERIAL
SMART MATRIX

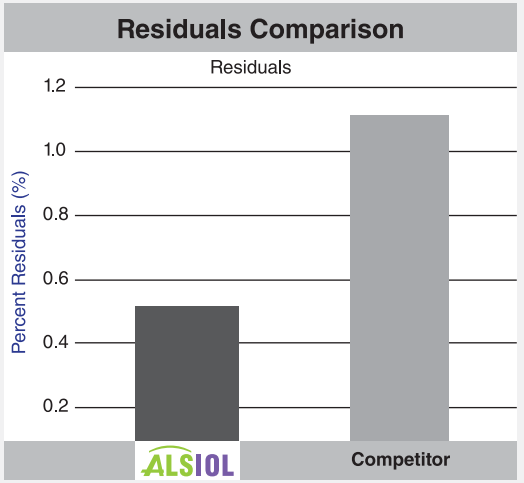
3- Pure Material

2 times more Pure than others

• **Ultra Pure monomers and Zero polymerization technology**; lowers the residual methacrylic acid monomer content and results in zero iconicity polymer which is 10 to 20X less acid than other 'highest purity' commercial monomers.

• **Zero iconicity of Smart matrix material** provides further degree of quality by eliminating the possibility of calcium phosphate particles appearing over time. And increases **strength** and **biocompatiblity of** ALsanza IOLs

• **Supports High optic Perfomance** In Point Spread Function Test (PSFT). Pure material keeps IOL durable and prevent microwrinklings on optic zone after folding and unfolding total hydrophobic IOLs additionally



MATERIAL

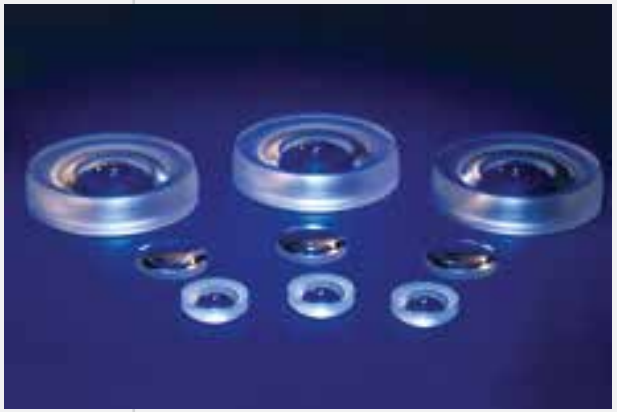
SMART MATRIX

3- Pure Material

produced in Virgin Glass Molds to higher biocompatibility

- **Virgin glass molds eliminates the contamination** unlike plastic molds that have high risk to realease agents, toxic components, lubricants, antioxidants commonly found in polypropylene and polyethylene resins

- These chemical contaminants can be found in competitor materials produced in plastic (polypropylene, polyethylene) molds.



MATERIAL

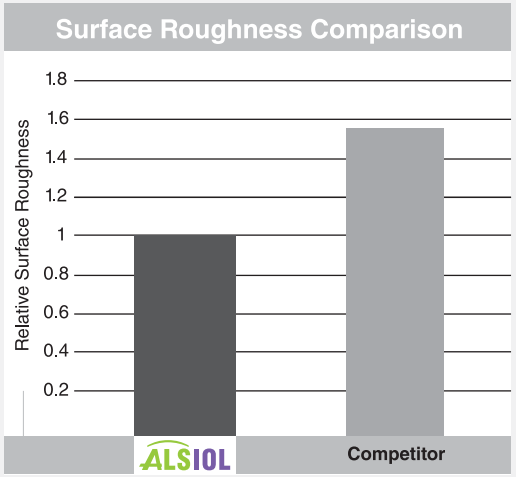
SMART MATRIX

4- Smooth IOL Surface

Smart Matrix exhibits **%33 lower surface roughness**s then competitors due to it's ultra pure monomer polymerization procedures with **zero ionicity** (less acid). That reduces matrix size and surface roughness of material

Designed for;
- Reduced LEC Migration and adhesion to lens optic
- Reduced PCO incidence*

The amount of surface irregularities is linearly related to the number of inflammatory cells adhering to the optic surface of the IOL and to the rate of LEC migration and PCO incidence*



*Analysis of intraocular lens surface properties with atomic force microscopy Marco Lombardo, MD, Maria P. De Santo, PhD, Giuseppe Lombardo, PhD, Riccardo Barberi, PhD,Sebastiano Serrao, MD, PhD

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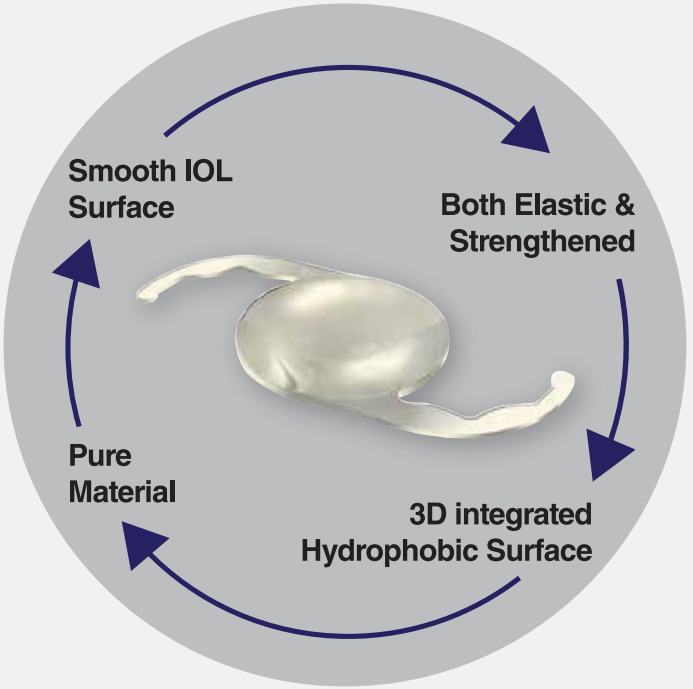
MATERIAL

SMART MATRIX



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FIT HAPTICS
Arms2FIT
Fins4FIT

HAPTIC DESIGNS
FIT HAPTICS

Expectations from Haptics in Surgery

A- **Responsable for stabilization** of IOLs inside crystalline bag. That is a key preventing factor against to rotation and tiltations.

B- Proper unfolding without **any harm on crystalline bag** during procedures

C- **Suspensive role** of haptics is **main protective factor** for desired optical results

D- Preserve **refractive stability with resisting contractive stresses in bag**

HAPTIC DESIGNS
FIT HAPTICS

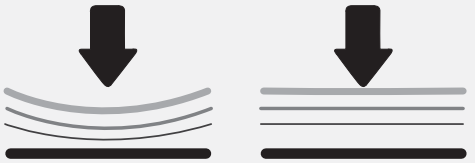
Definifition of Haptic Suspension

- **FIT HAPTICs** are designed to resist tensile and bending stresses which comparely high in upper and lower part of crystalline lens bag

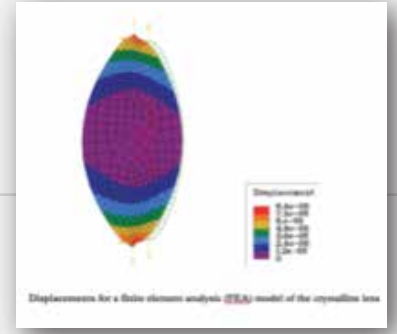
- Crsytalline bag pressures are transmitted from FIT Haptic contact areas to IOL body

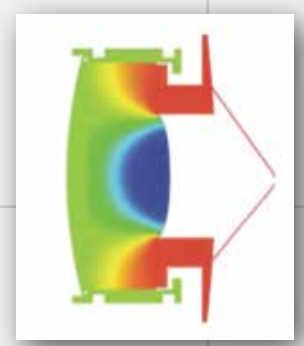
- FIT HAPTICS specially designed to behave **suspensive against external stresses in order to preserve stability and desired central optic position.**

When compressed or stretched, a spring gains elastic potential energy.



compressed stretched





With suspansive behavior, stability and central optic position is preserved aginst high tensile and bending stresses

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HAPTIC DESIGNS
FIT HAPTICS

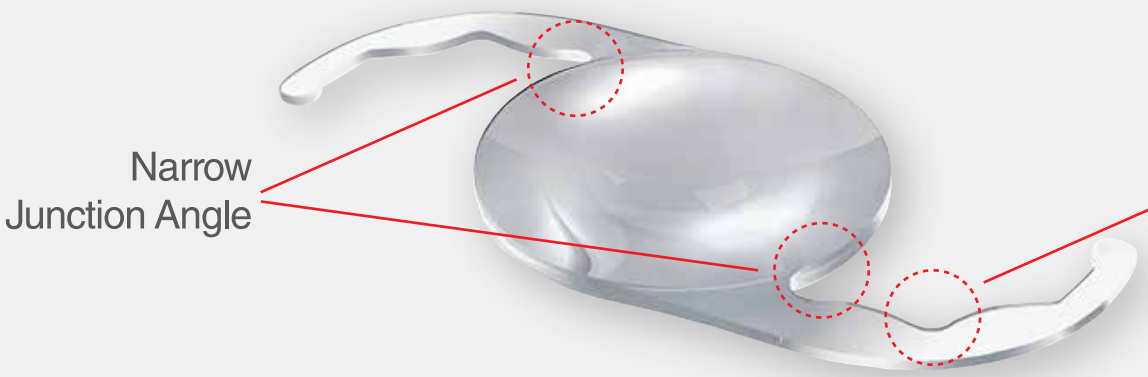
What is the difference from the Dr's perspective interms of Arms2Fit and Fins4FIT designs?

FIT HAPTICs	
Arms2Fit	**Fins4Fit**
Overall Ø : 13.00 mm Classical model	Overall Ø : 11.00 mm New generation
2 contact points	4 contact points
2 Suspensive Arms	**4 Suspensive Fins**
Preserved stability and desired central optic position	**Preserved stability and desired central optic position**

HAPTIC DESIGNS

FIT HAPTICS

Arms2Fit



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HAPTIC DESIGNS
FIT HAPTICS

Arms2Fit
Preserve stability and desired central optic position

Arms2FIT Haptic design **adds** a new perspective to tradition with its unique design

Unique Suspensive additions;

- **'Narrow junction angle' improves suspensive movements of** Arms to maintain IOL and optical field stability

- **'Stress Dimmer Curves'** of inner arms **softens transmitted stresses** to support function of Suspensive Narrow junction angle

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HAPTIC DESIGNS
FIT HAPTICS

Arms2Fit
Preserve stability and desired central optic position

Both Flexy & Strong FIT Arms

- **Minimize** tiltations mainly resulting from contractions, tensile or bending stresses sourced by crystalline bag

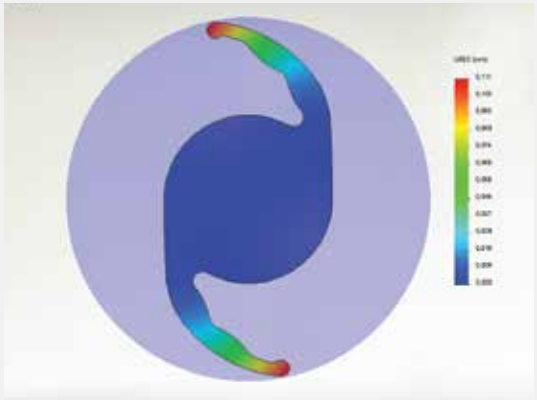
- Support **Harmony** between Crystalline Bag & IOL to preseve desired refractive stability

Overall 13mm distance

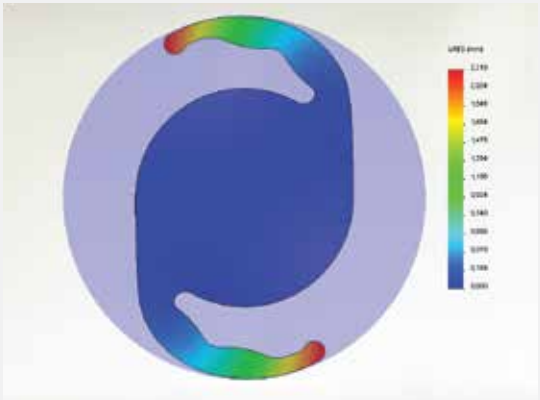
HAPTIC DESIGNS
FIT HAPTICS

Arms2FIT

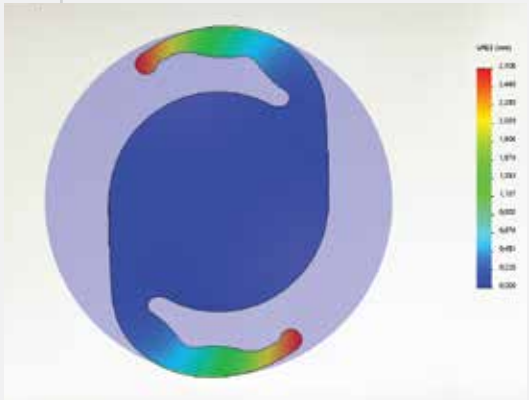
FIT Arms and Stress dimmer curves prevent reaching of stress to the optical field.



9,5 mm



10 mm



13 mm

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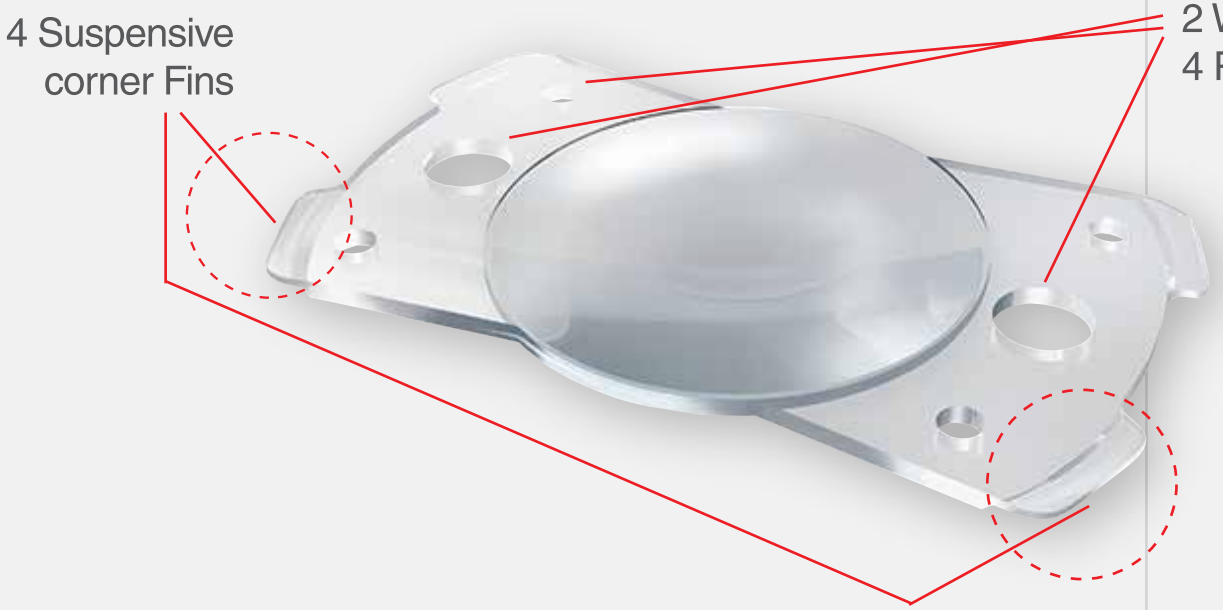
HAPTIC DESIGNS
FIT HAPTICS

Fins4FIT



HAPTIC DESIGNS
FIT HAPTICS

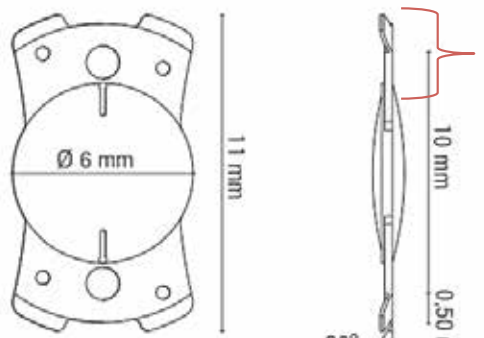
Fins4FIT
Preserve stability and desired central optic position

Sophisticated Design

- **Suspensive Corner Fins**; behave self-adaptive to fit different sizes of cristalline bag

- **4 Wide OVD Aspiration Holes**; facilitate final aspirations in surgery

- **4 positioning holes**; supports more accurate lens positioning



0° of Fin4FIT haptic angle

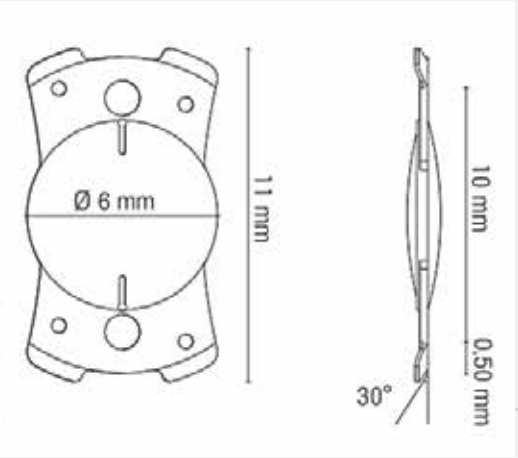
HAPTIC DESIGNS
FIT HAPTICS

Fins4FIT
Preserve stability and desired central optic position

II. Extremely Suspensive

• 4 Suspensive Corner Fins demonstrate suspensive movements against compression stresses. Show high tendency to preserve IOL position and refractive stability with reducing risks of tiltations caused eventual crystalline bag contractions

• 6 Additional holes are also supportive adds to soften transmitted external stresses on to IOL



When compressed or stretched, a spring gains elastic potential energy.

compressed stretched

HAPTIC DESIGNS
FIT HAPTICS

Fins4FIT
Preserve stability and desired central optic position

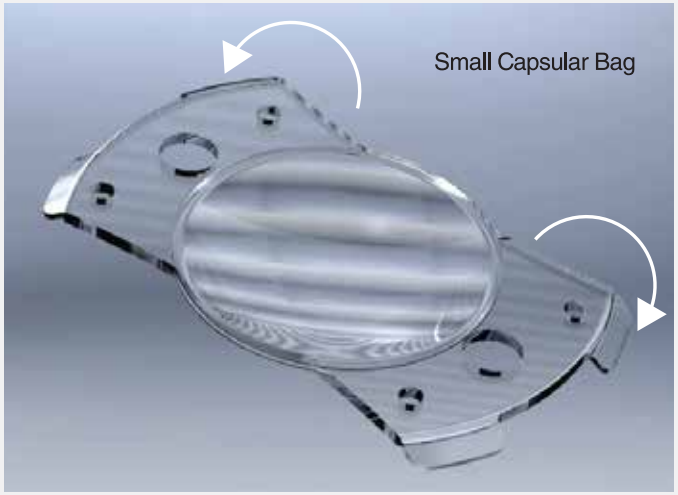
III. Harmonically stable and adaptive

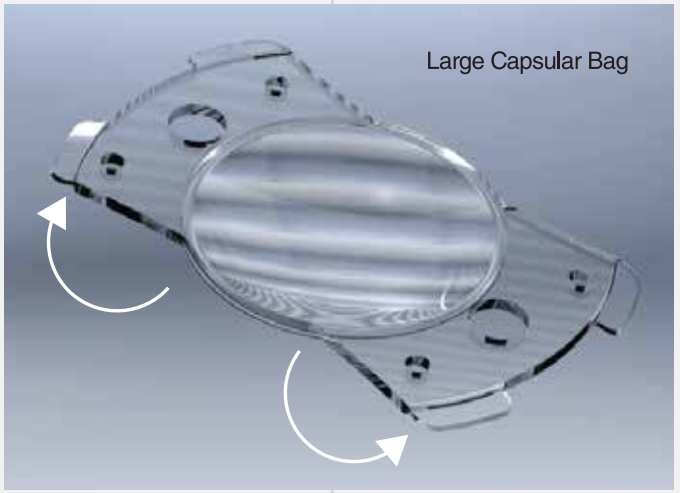
• Fins4FIT haptic design enhances ALSAFIT IOLs with self-adaptive feature of corner fins. Corner Fins able to stabilize all IOL either in Small or Larg Capsular bag sizes by easy self-adaptation

HAPTIC DESIGNS
FIT HAPTICS

Fins4FIT
Preserve stability and desired central optic position

- Self-adjustable behavior of 4 Suspensive Corner Fins in various Capsular Bag sizes.





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HAPTIC DESIGNS

FIT HAPTICS

I. Sophisticated Design

II. Extremely Suspensive

III. Harmonically stable and adaptative

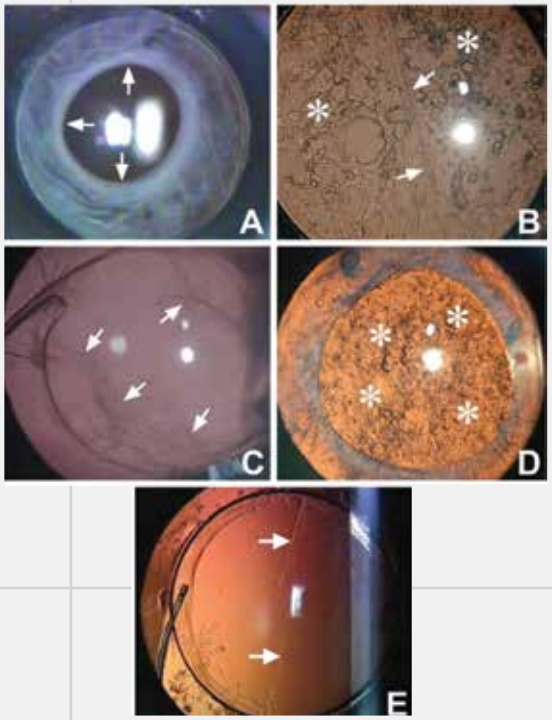
DIAMOND CUT EDGE

DIAMOND CUT EDGE

Posterior Capsule Opacification (PCO) types

Preventing “after-cataract” reactions is a strenuous fight against nature because lens epithelial cell (LEC) migration and transdifferentiation are nature’s back-up strategies to the loss of lens tissue.

Eyes showing various forms of capsular opacification.
A, Extensive anterior capsule opacification;
B, Mixed type of PCO with fibrous (arrow) and pearl type areas (asterisk);
C, Fibrous form of posterior capsule opacification (arrow);
D, Proliferative or pearl form of posterior capsule opacification (asterisk);
E, Linear posterior capsule opacification

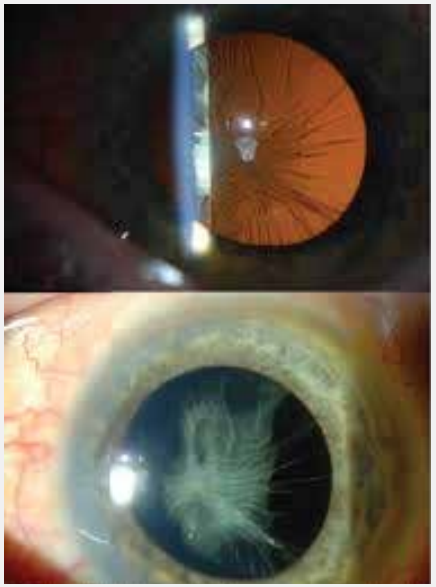


DIAMOND CUT EDGE

PCO still a major hurdle in successful cataract surgery

- PCO results from the growth and **abnormal proliferation of LECs** (Lens Epithelial Cells) on the capsule at the time of cataract surgery.

- These cells **migrate** to the posterior capsule where they approach the central visual axis and cause visual axis obscuration, resulting in dimness of vision.

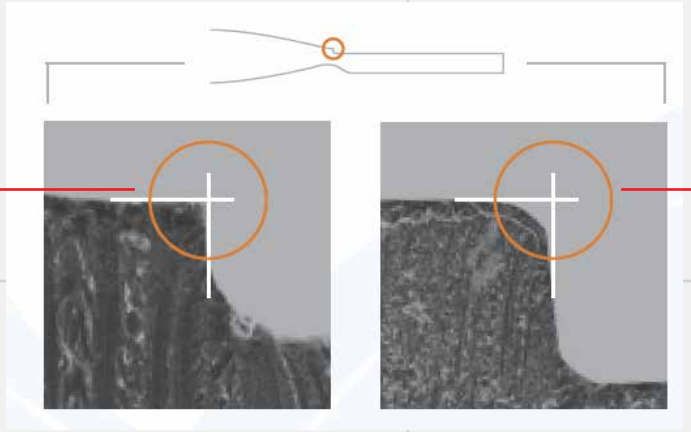


DIAMOND CUT EDGE

‘Edge Effect’
Junctional area of Optic & Haptic parts of IOL

• Recent clinical experiences shows that ‘**edged IOLs reduces the PCO area** and severity compared with an identical **round-edged IOLs**’.

• According to Kerry D. Solomon, MD, OSN Refractive Surgery Board Member, he noted ‘edged design **slows down or delay the migration**, and that carried over to the design of lens optics,.” “The more square of an edge and the more defined of an edge, the better the delay or the better the barrier”

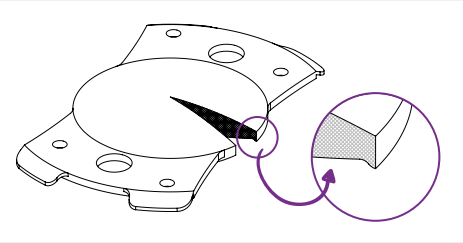


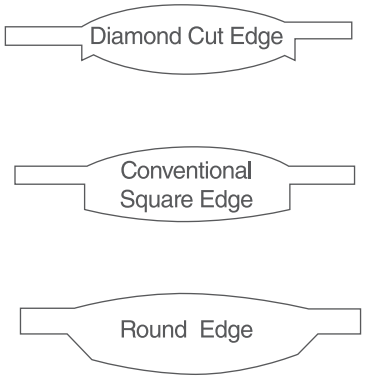
DIAMOND CUT EDGE

Continous Optic Quality

All ALSANZA IOLs have most prominent edges with Diamond Cut Edge design that frames all optical field. More sharpened design of Diamond Cut Edge most efficiently blocks LEC migration than conventional square edge& round edge designes.

• Diamond Cut Edge is developed for Anti-Migration effect for LECs and reduce PCO occurence





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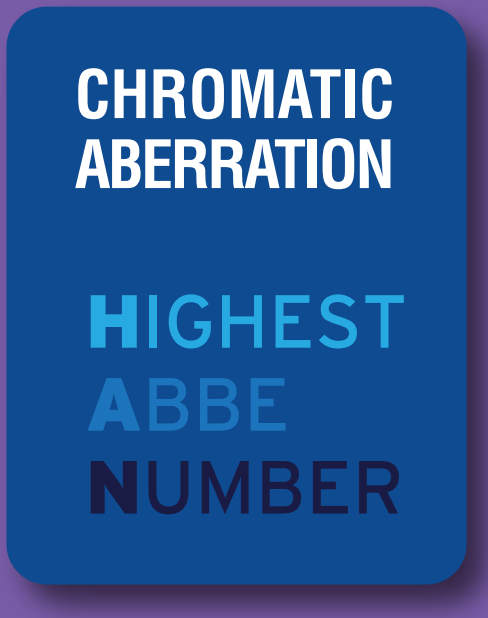
ALSIOL | ALSIOL VF | ALSAFIT

HIGHEST ABBE NUMBER

Cromatic Aberration Control



CHROMATIC ABERRATION

HIGHEST ABBE NUMBER

Chromatic Aberration

- **Chromatic Aberration** is a kind of defect of Optic system resulting different wavelengths of **light focus at different distances unproperly**

- They are refracted through different angles.

- Chromatic aberration depends on refractive indices of lens. High chromatic aberrations produce a **blurred image with coloured fringes**

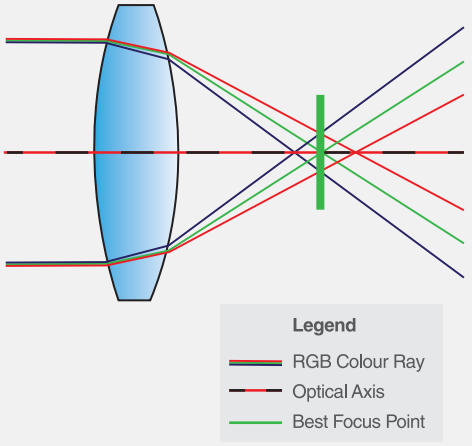
CHROMATIC ABERRATION

HIGHEST ABBE NUMBER

Chromatic Aberration

Resulting from wavelengths with different refraction index

Longitudinal/Axial
Chromatic Aberration

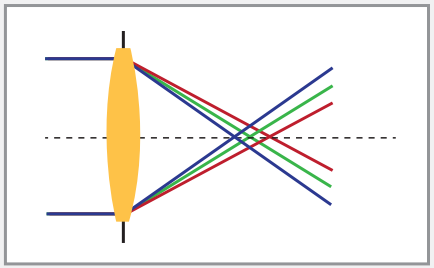


CHROMATIC ABERRATION
HIGHEST ABBE NUMBER

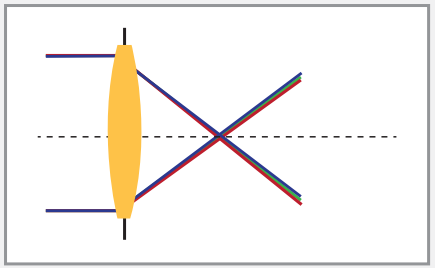
Abbe Number (V - number)

- Chromatic aberration has **inverse ratio** with Abbe Number of IOL

$$V_d = \frac{n_D - 1}{n_F - n_C}$$



IOL material with high chromatic aberration
(low Abbe number)



IOL material with less chromatic aberration
(high Abbe number)

nd, nF and nC are the refractive indices of the material at the wavelengths of the Fraunhofer d- (587.6 nm), F- (486.1nm) and C- (656.3nm) spectral lines. The low dispersion materials have high value of V.

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CHROMATIC ABERRATION
HIGHEST ABBE NUMBER

HIGHEST ABBE NUMBER

• Comparing with others AlsIOLs offers **highest Abbe Number** in market which enables to have strongest Chromatic Aberation Control

	SA correction	Refractive Index	Abbe Number
Alcon Acrysof	-0.20	1.55	37
AMO tecnis	-0.27	1.47	55
Crystalline Lens	+0.27	1.41	47
ALSIOLs	-0.09	1.46	58

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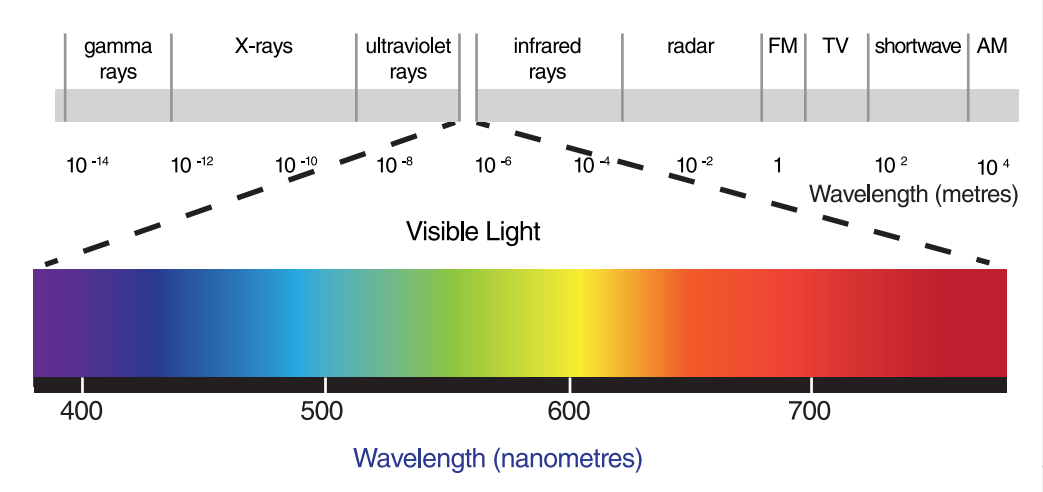
VIOLET FILTER
Effective Photoprotection

VIOLET FILTER

Visible Light

The visible spectrum is the portion of the electromagnetic spectrum that is visible to the human eye. A typical human eye will respond to wavelengths from about 390 to 700 nm.

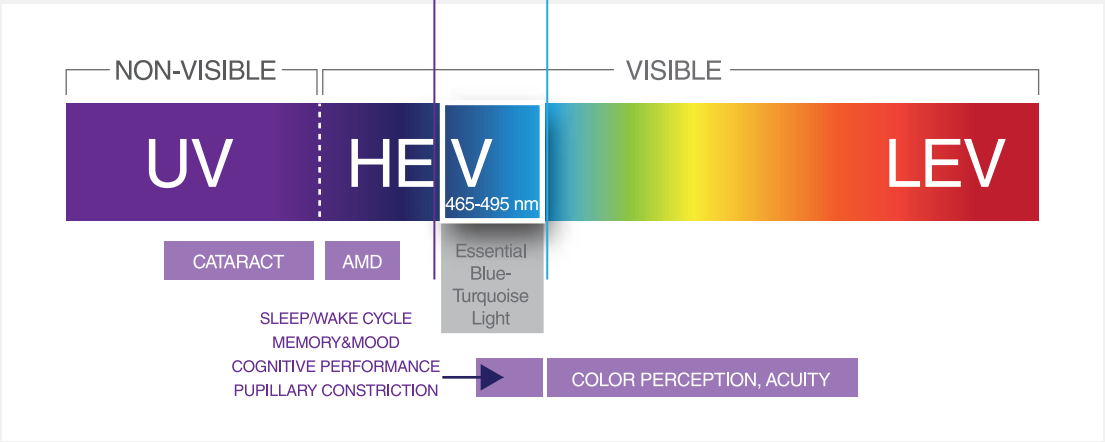


VIOLET FILTER

Violet Filter or Blue blocking ?

Violet Filter reduce retinal exposure to Violet (400-440 nm) light and shorter wavelength including UV radiation.

Blue blocking IOL attenuate blue (440-500) light and shorter wavelengths including UV radiation.



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VIOLET FILTER

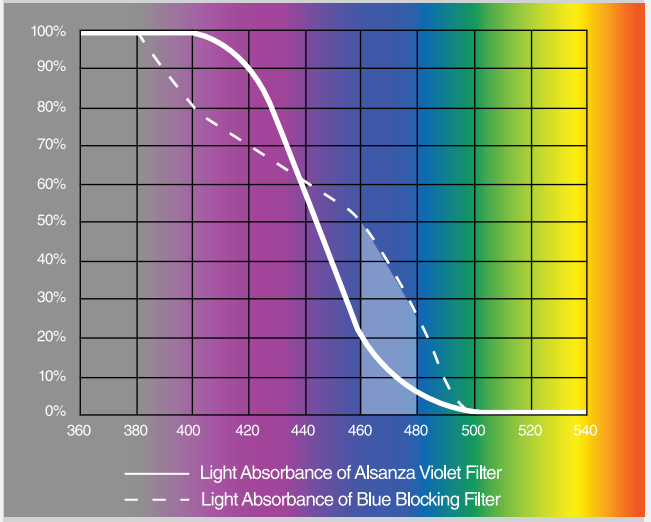
Why Blue Light Transmission is important

- Blue light has an important role in the **circadian system**, affecting the sleep–wake cycle, mood and cognition.

- Circadian system primarily depends on photopigment **regulation of melanopsin**

- Melanopsin has a peak absorption at **465-480 nm**

Light Absorbance Comparison of
Alsanza IOLs with Violet filter & Blue Blocking IOLs



Compare to Blue Bloking Filter, Alsanza Violet Filter provides 3 times more essential Blue light transmission in range of 460nm-480nm for regulation of circadian system

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VF: Transmission performance same as Natural lens

- ALSIOL VF is effective for UV and Violet Spectrum photoprotection avoiding total blue blocking

- ALSIOL VF provides %95 of blue light transmission at **480 nm** wavelength that has significant role in the circadian system

- Additinally blue light is **important for the scotopic vision**

VIOLET FILTER

Which chromophore does VF use

- ALSIOL VF has **3- hydroxykyurenine** same photoselective chormophore as natural crystalline lens

- 0,02 % concentration of chromophore do not cause **chromatic disorders** unlike 0,04 % concentration synthetic dye filtered Blue Blocking IOLs does.

- Using natural chromophore and its lower concentrations allow **clearer contrast sensitivity**

0,02 %
3-hydroxykynurenine

0,04 %
Synthetic dye filter chromphore

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VF Filter …to Arrive Natural Benefit…

- **Mimics Nature**
  - Protects retina without blocking essential blue light in order to facilitatecircadian system
  - Optimal concentration of exact crystalline chromophore provides clearer contrast sensitivity and color perception contrary to ‘synthetic yellow filters’ does.

- **Offers Sufficient Photoprotection without Deficient Phototransmission**
For better scotopic vision with blue photoreception

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Manufacturing and Product Quality

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ALSIOL | ALSIOL VF | ALSAFIT

MANUFACTURING & PRODUCT QUALITY

DIOPTER RANGE

ALSIOL, ALSIOL VF, ALSAFIT	FROM -10 TO -0.5 & 32.5 TO 45
ALSIOL, ALSIOL VF, ALSAFIT	FROM -20 TO -10.5 & ABOVE 45
	EXTREME PRODUCTION

Monofocal - Aspheric - FINS4FIT Haptics

ALSAFIT

Monofocal - Aspheric - FINS2FIT Haptics

ALSIOL

Monofocal - Aspheric - FINS2FIT Haptics - VF

ALSIOL VF

MANUFACTURING & PRODUCT QUALITY

HIGHER DIOPTRIC ACCURACY
Well above the Standarts

Alsanza Optic Intellegence standardize **more sensitive dioptric deviation control** than international standards. Manufacturing process ensures to perform **High Dioptric Accuracy** in total range of IOLs with 0.25D very low dioptric deviation value

DIOPTRIC DEVIATION VALUES	
International Standarts: Acceptable max. dioptric deviation value	± 0.4
ALSANZA Optic Intellegence: Acceptable max. dioptric deviation value	**± 0.25**

MANUFACTURING & PRODUCT QUALITY

MTF

- **MTF (Modulation Transfer Funtion)** indicates the ability of an optical system to reproduce (transfer) various levels of details (spatial frequancies) from object to image.

- This is a way to describe the **contrast sensitivity** of an optical system.

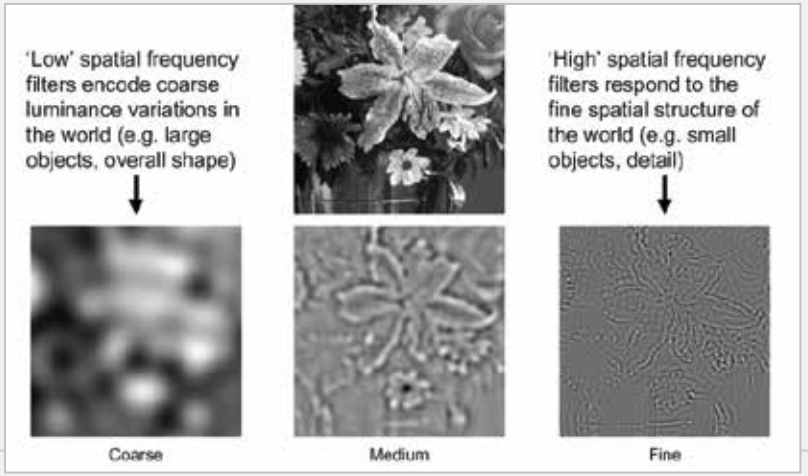
- MTF is described as visual preformance of IOLs

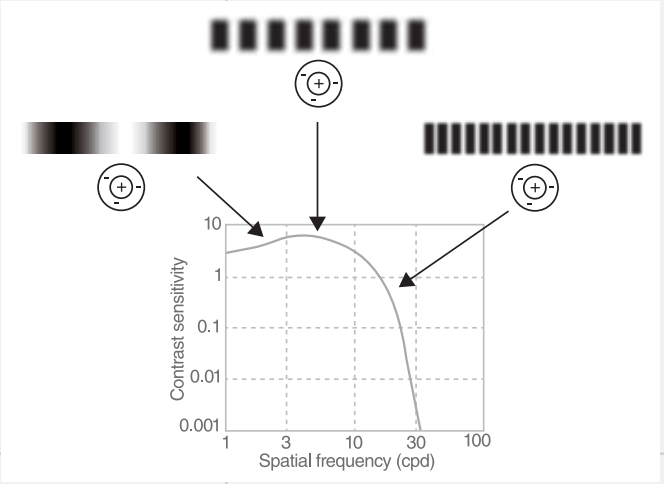
- According to international IOLs standards MTF result must be above **0.43 at 100 lpm (lines per milimeter)**

MANUFACTURING & PRODUCT QUALITY

MTF and Contrast Sensitivity

As line spacing decreases (i.e. **the frequency increases**) on the object, it becomes increasingly difficult for the lens to transfer image contrast. Decreased contrast sensitivity determines low MTF value.





MANUFACTURING & PRODUCT QUALITY

MTF - ALSANZA
Well above the Standards

- **With 0,60 at 100 lpm**, ALSANZA IOLs presents one of highest MTF value in competiton

- **Optic quality of ALSANZA IOLs present well above International standards.** Permitted MTF value is established as only 0,43 at 100 lpm for global IOL manufacturers

- ALSANZA executes strict control mechanism to maintain high standards High Standards

Each product's MTF value is individually checked in production line one by one

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ALSIOL | ALSIOL VF | ALSAFIT

MANUFACTURING & PRODUCT QUALITY

MANUFACTURING&OPTIC QUALITY
Well above the Standards

ASPHERICITY
24 H

24H ASPHERICAL CORRECTION
Asphericity for All Day and Night

VIOLET FILTER

VIOLET FILTER
Arrive Natural Benefit

MATERIAL
SMART MATRIX

SMART MATRIX WITH IPN TECHNOLOGY
3D structured Privilages

CHROMATIC ABERRATION
HIGHEST ABBE NUMBER

HIGHEST ABBE NUMBER
Cromatic Aberration Control

HAPTIC DESIGNS
FIT HAPTICS

FIT HAPTICS
Preserve stability and desired central optic position

DIAMOND CUT EDGE

DIAMOND CUT EDGE
Continous Optic Quality

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Thank you