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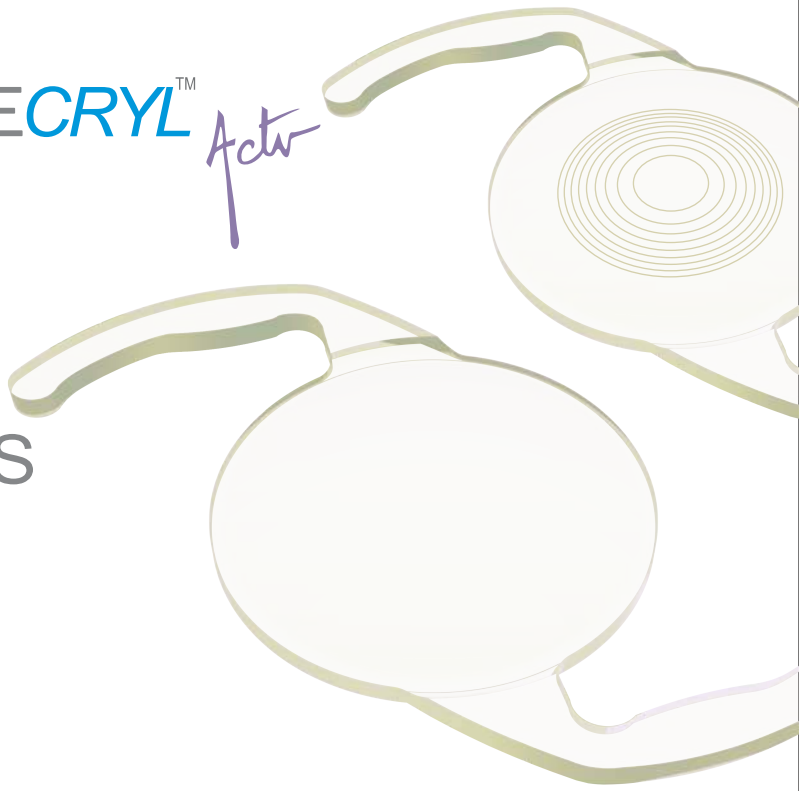
EYECRYL™

Optimally Hydrated Natural Yellow Hydrophobic IOLs

EYECRYL™ Actv

EYECRYL™ PLUS



A breakthrough in hydrophobic IOL technology - NO GLISTENINGS

- Controlled surgical manipulation
- Enhanced bio-adhesion
- Increased bio-mechanical stability
- Excellent folding & unfolding
- No fluid exchange with Aqueous Humor
- Resistant to environmental stress or environmental conditions like temperature, humidity & contamination and hence reduced risks of inflammation

Glistenings: A material characteristic in today's Hydrophobic Acrylic IOLs[20-29]

Glistenings are fluid-filled microvacuoles within the optic when the IOL is in an aqueous environment. Temperature changes are considered primary factor for glistenings as shown in several studies of the mechanism and causative factors of glistenings.

Glistenings scatter light and cause:

- Significant reduction in light transmission through the lens
- Reduced Modulation Transfer Function (MTF) of the IOL
- Reduced contrast sensitivity, and increased halos & glare sensitivity

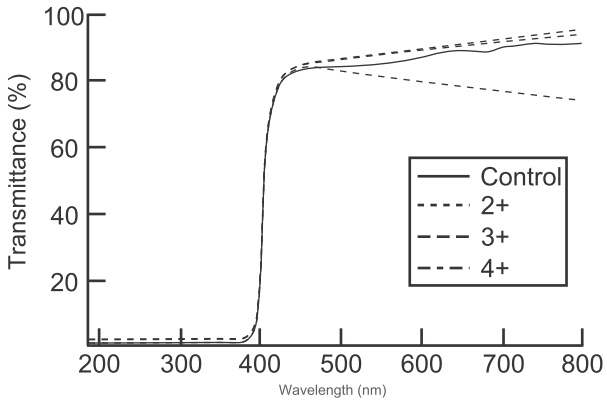


Figure 1:
Spectral transmission with Glistening level (control to Level 4+)

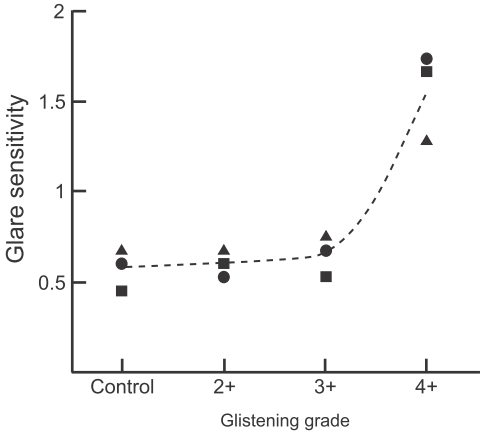


Figure 2:
Glare sensitivity index evaluated by ophthalmologists
The line indicates the average value

Technological Excellence:

EYE*CRYL*™ IOLs are optimally hydrated hydrophobic intraocular lenses. The equilibrium water content is achieved through pre-hydration of the lens material:

- Retains all hydrophobic material characteristics
- Stabilizes IOL material against temperature and environmental changes
- No aqueous changes in IOL material once implanted in the eye - hence, IOL remains free of glistenings

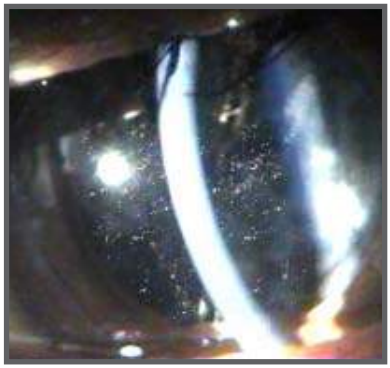


Figure 3:
Slit lamp photography of Micro Vacuoles or Glistening of level 4+ in a well known hydrophobic IOL available in the market

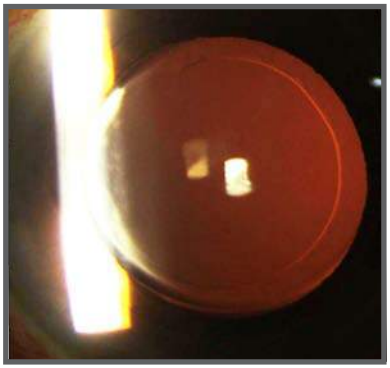


Figure 4:
Slit lamp photography of Glistening-free EYE*CRYL*™ Optimally Hydrated Natural Yellow Hydrophobic IOL

- Advanced material of the lens enables surgeon to perform small incision cataract surgery
- Tackiness properties of material enables the lens to adhere to capsular bag & postpones onset of PCO, providing stability to the lens in the eye
- Excellent bio-compatibility - complying requirements of ISO 10993
- IOL material reduces glare sensitivity and increases contrast sensitivity

Violet-Blue Light Filter: An optimal solution for Retina protection[17-19]

- EYE*CRYL*™ IOLs contain a unique covalently bound natural Chromophore, which contains the same UV-A blocking and Violet-Blue Light filtering Chromophore that is in the human crystalline lens. We use nature's own solution to the problem of protecting the Retina from harmful energetic light. The absorption spectrum of 3 Hydroxy Kynurenine (Figure 5) shows that this natural compound is an excellent UV-A blocker with a secondary purpose of filtering Violet-Blue Light. This compound and it's Beta Glucoside derivatives are nature's primary protection for UV-A and Violet-Blue Light.

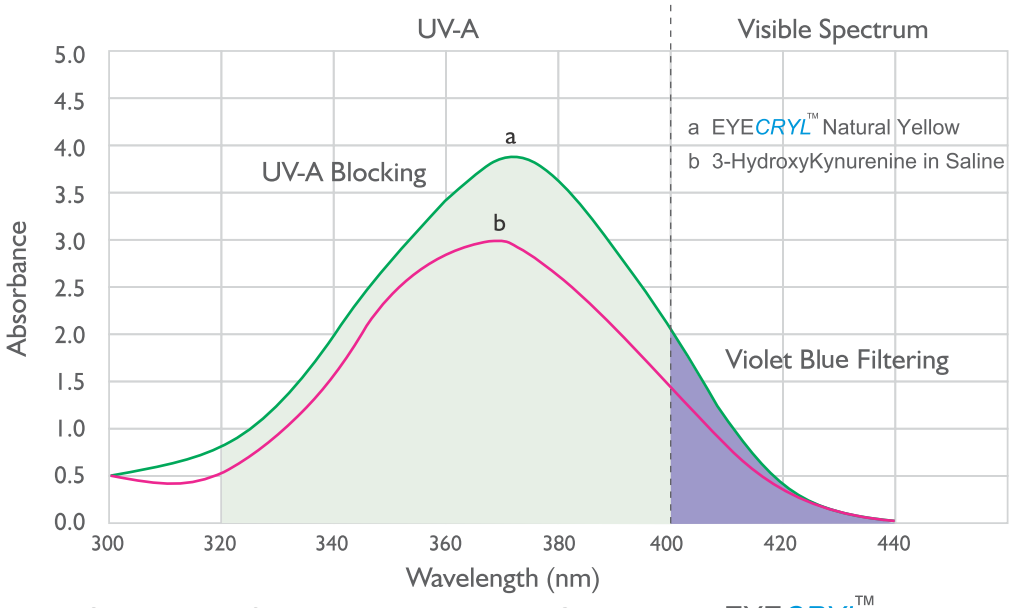


Figure 5: Comparison of 3-HydroxyKynurenine in Saline versus EYE*CRYL*™ Natural Yellow

Thus, EYE*CRYL*™ IOLs provide Violet-Blue Light filtering similar to a young natural crystalline lens and without altering color perception & contrast sensitivity.

Improvement in Scotopic Vision[14-16]:

Scotopic vision is the vision of the eye under low light conditions. In the human eye, cone cells are nonfunctional in low light. Scotopic vision is produced exclusively through rod cells which are most sensitive to wavelengths of light around 498 nm (Green-Blue). The below mentioned graph shows that the quality of the scotopic vision is at its peak for the visible spectrum ranging from 450 nm to 550 nm. The quality of scotopic vision decreases by filtering healthy Blue Light of 440 nm to 500 nm. Whereas, EYE *CRYL*™ IOLs through its unique Natural Yellow Chromophore filters 400 nm to 440 nm of Violet-Blue Light spectrum only, not to affect the quality of Scotopic vision.

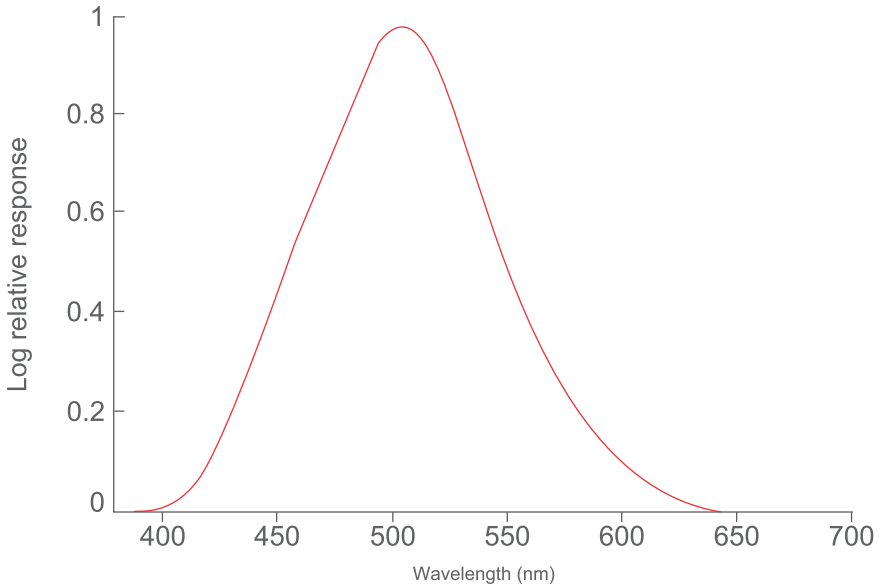


Figure 6: The CIE 1951 scotopicluminosity function. The horizontal axis is wavelength in nm.

Circadian Rhythm[01-05]:

- In humans, Melatonin is produced by the Pineal Gland, a small endocrine gland located in the center of the brain but outside the blood-brain barrier. The Melatonin signal forms part of the system that regulates the sleep-wake cycle by chemically causing drowsiness and lowering the body temperature.
- Production of Melatonin by the Pineal Gland is inhibited by light to the Retina and permitted by darkness. Its onset each evening is called the Dim-Light Melatonin Onset (DLMO).
- It is principally Blue Light, between 460 to 480 nm, that suppresses Melatonin, proportional to the light intensity and length of exposure.
- By filtering Blue Light ranging up to 500 nm, secretion of Melatonin increases & ultimately disturbs the Circadian Rhythm.
- Biotech Vision Care uses Natural Yellow hydrophobic material from Benz Research & Development (US Patent 7,947,796) to manufacture EYE*CRYL*™ lenses which blocks UV-A & filters Violet-Blue spectrum of light ranging from 400 nm to 440 nm and doesn't affect Circadian rhythm.

Chromatic Aberration: Relation with ABBE No.[06-13]

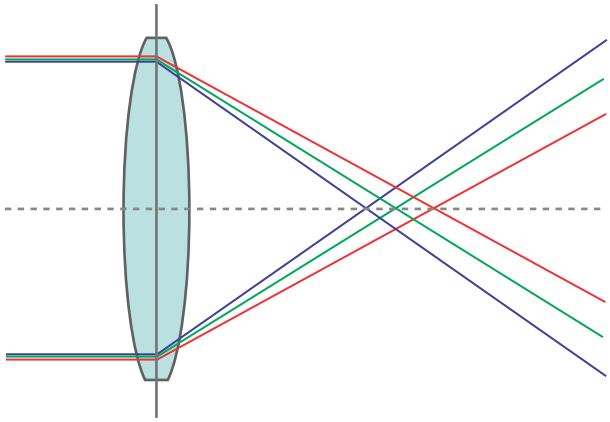


Figure 7: Chromatic Aberration arised through IOL material having low ABBE No.

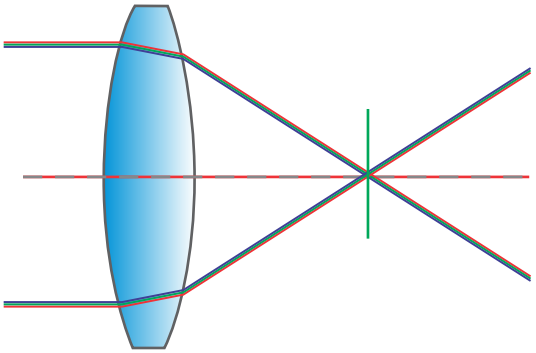


Figure 8: Reduced Chromatic Aberration through IOL material having higher ABBE No.

- ABBE No. is the significance of the Chromatic Aberration which could rise by the material used to manufacture the IOL.
- EYE*CRYL*™ IOLs are manufactured using Natural Yellow Hydrophobic material having ABBE No. of 49. This results in the decreased amount of Chromatic Aberration & provides excellent visual outcomes postoperatively.

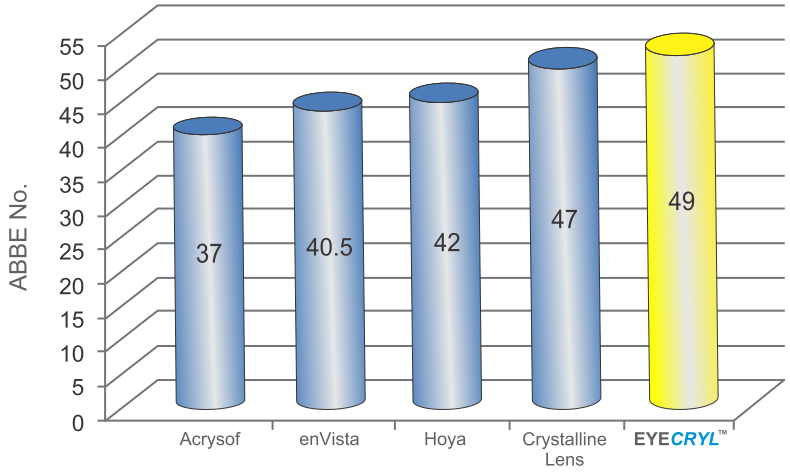


Figure 9: High ABBE No. indicates low degree of Chromatic Aberration

Optimally Hydrated Natural Yellow Hydrophobic IOLs

EYE*CRYL*™ Actv IOLs are **Diffractive – Refractive Multifocal IOLs** having a series of concentric rings with diffractive steps.

Background:

- The spacing between the steps gets progressively closer together from the center of the lens towards the edge. EYE*CRYL*™ Actv IOLs use this type of design to provide excellent distance and near vision along with good intermediate vision.

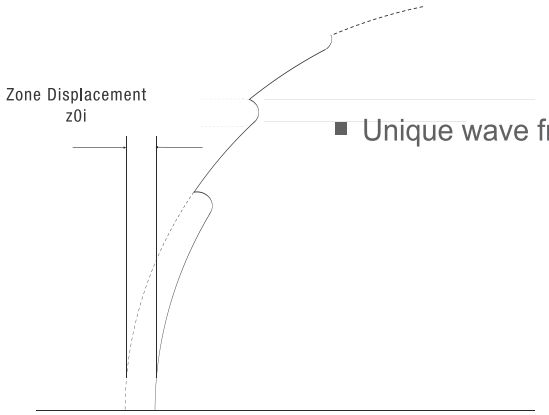


Figure 10: Lens Surface Diagram

Special Features:

- Asymmetric light distribution, 60% for distance & 40% for near, independent of pupil size
- Excellent distance and near vision along with good intermediate vision
- Near addition of + 3.0 D
- Reduced glares and halos with unique step design
- Dependency on reading glasses is reduced
- Improved visual outcomes in all lighting conditions
- Negative Spherical Aberration to compensate Positive Spherical Aberration of the Cornea

Figure 11: Simulated Vision Through Mono Focal IOL

Figure 12: Simulated Vision Through EYECRYL™ ACTV IOL

Energy Scan Diagram:

As shown in the energy scan diagram first energy peak corresponds to distance vision (21.0 D in this case). Second unique peak shows intermediate vision at +1.5 to +2.0 D (23.0 D in this case). Third peak corresponds to near vision energy at +3.0 D (24.0 D in this case).

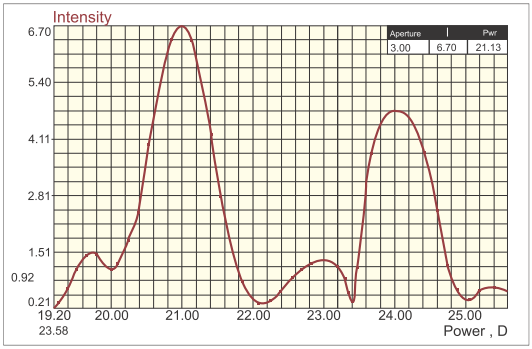


Figure 13: Energy Scan Diagram

General Features:

- Optimized 'C' haptic design with angle at optic – haptic junction for better stability in the Capsular Bag
- Surgery induced astigmatism is not seen with sub 2.6 mm incisions
- The level of biological contamination is almost zero (Bacterial Endotoxin is less than 0.25 EU/IOL)
- IOL has advanced 360° square edge to reduce chances of PCO
- Sharp and crystal clear vision
- Post-Operative visual acuity is increased by compensating Spherical Aberration of the Cornea
- Contrast sensitivity is greatly increased through aspheric optic in all lighting conditions as compared to other bifocal and multifocal lenses having non aspheric optics

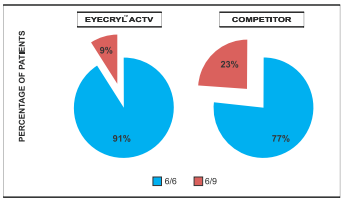


Figure 14: Far Vision

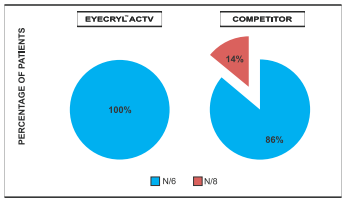


Figure 15: Near Vision

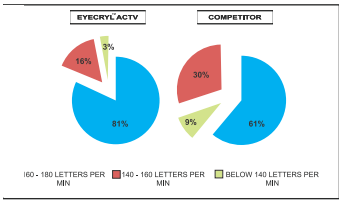


Figure 16: Reading Speed

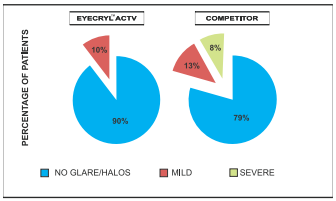


Figure 17: Glare & Halos

After having implanted a EYECRYL™ Actv ,patient's dependency on glasses is largely decreased. Without glasses or with minimum dependency on glasses, patient can get ideal visual acuity for uncorrected distance, intermediate and near vision. Patients can perform and continue day to day activities without the need & help of glasses and contact lenses.

Optimally Hydrated Natural Yellow Hydrophobic IOLs

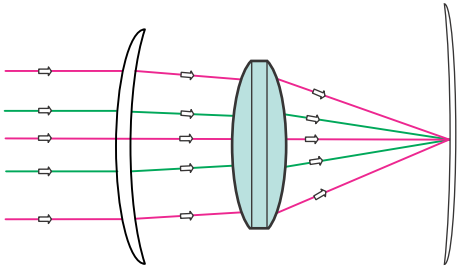


Figure 18:
Aspheric IOLs with -ve S.A.

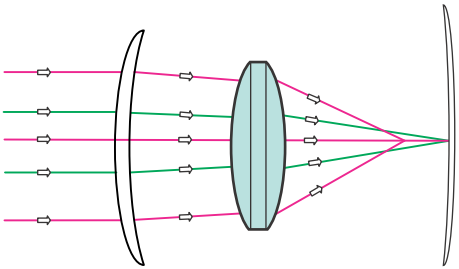


Figure 19:
Conventional Spherical IOLs with +ve S.A.

Features:

- Negative Spherical Aberration to compensate Positive Spherical Aberration of the Cornea
- 360° Advanced Square Edge
- Enhances Contrast Sensitivity, Sharpness & Clarity at night
- Smooth lens surface reduces bacterial adhesion & inflammatory cell response
- Enhanced functional outcomes in Mesopic & Scotopic lighting conditions
- Less sensitive to tilt & decentration

The simulated point spread function and image in the eye on Retinal plane with Negative Spherical Aberration IOL (Fig. 20), with Zero Spherical Aberration IOL (Fig. 21), and with Conventional Spherical IOL (Fig. 22)

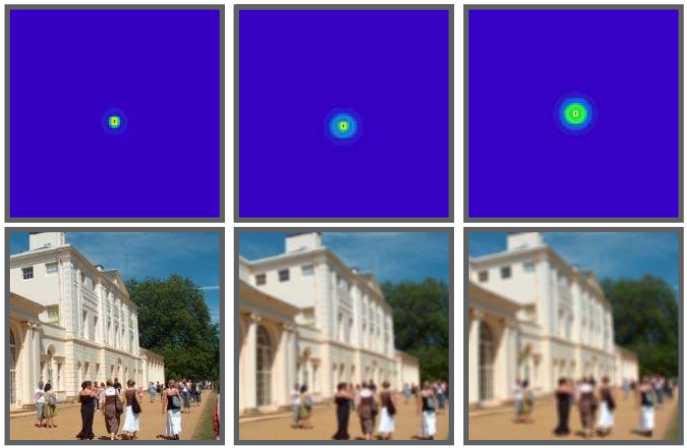


Figure 20 **Figure 21** **Figure 22**

Technical Data:

DIHFY600

ASHFY600

Brand	EYECRYL™ Activ	EYECRYL™ PLUS
Model	DIHFY600	ASHFY600
Material	Hydrophobic Acrylic containing Natural Chromophore	Hydrophobic Acrylic containing Natural Chromophore
Water Content	1 - 4 %	1 - 4 %
Optic Type	Biconvex, Single Piece, Diffractive, 360° Square Edge with Aspheric Optic	Biconvex, Single Piece, 360° Square Edge with Aspheric Optic
Near Addition	+ 3.0 D	N.A.
Optic Size	6.00 mm	6.00 mm
Overall Size	13.00 mm	13.00 mm
Angulation	0°	0°
ACD	5.28	5.28
In Site Refractive Index	1.483	1.483
Estimated A-Constant	118.5	118.5
Recommend Optical A-Constants	SRK - T: 118.7	SRK - T: 118.6
	SRK - II: 118.9	SRK - II: 118.9
	Holl. 1 Const. SF: 1.63	Holl. 1 Const. SF: 1.63
	HOFFER-Q ACD: 5.42	HOFFER-Q ACD: 5.43
	HAIGIS: a0: 1.24, a1: 0.40, a2: 0.10	HAIGIS: a0: 1.20, a1: 0.40, a2: 0.10
Diopter Range	+7.5D to +30.0D (with 0.5 D step)	+ 5.0 D to + 30.0 D (with 0.5 D step)
Sterilization	By Irradiation	By Irradiation
Indication	Phacoemulsification	Phacoemulsification
Implantation Site	Capsular Bag	Capsular Bag

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