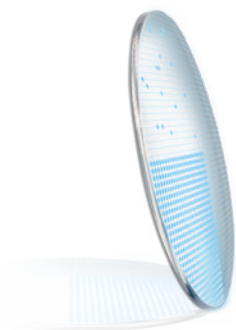


Single Vision
just got upgraded.

New ZEISS ClearView Lenses



Seeing beyond



ZEISS ClearView Single Vision Lenses

- Freeform technology in standard single vision
- Available as surfaced and finished SV
- Very thin and very flat without optical compromise
- On average 3x larger area of excellent vision clarity¹

www.zeiss.ca/pro-clearview

Freeform Single Vision technology, now available in standard single vision.

ZEISS is the pioneer of freeform technology for surfaced, customized Rx lenses. We have now found a way to further utilise this technology by getting complex freeform single vision lens shapes into the single vision category, in surfaced and finished SV lenses. This innovation has raised the standard of single vision.

Standard single vision, and especially FSV “stock” lenses are globally the most sold ophthalmic lens type thanks to their low cost and fast delivery time. However, these lenses typically do not provide great optics away from the lens centre. The demand for flatter and thinner lenses in particular, has compromised the peripheral optical performance.

The standard single vision category is about to be upgraded.

Introducing ZEISS ClearView Single Vision:

A new standard, Surfaced and Finished SV Lenses.

With ZEISS ClearView Single Vision Lenses, wearers can experience excellent vision clarity from the lens centre to the periphery. The lenses are flatter, thinner, and more attractive than conventional single vision lens designs that rely on steeper base curves to provide acceptable optical performance.

Offer your customers the benefits of freeform optimization, at the same cost and delivery time frame of a FSV / stock lens or a conventional surfaced SV.

Freeform in standard single vision

Point-by-point optimization

process using 700 free parameters in every lens design.

Up to 16 % thinner

Up to 16 % thinner than ZEISS spherical (SPH) FSV and up to 8 % thinner than ZEISS aspherical (AS) FSV – **without compromising vision.**^{2,3}

Up to 49 % flatter

Up to 49 % flatter compared to ZEISS spherical (SPH) FSV and up to 32 % flatter compared to ZEISS aspherical (AS) FSV – **without optical compromise.**^{4,5}

3× larger zone of clarity

Clear viewing from the lens centre to the periphery with a zone of excellent vision clarity, on average 3× larger, compared to ZEISS aspherical (AS) FSV lenses.¹

Consumers demand comfort and clarity, but standard single vision lenses compromise on optics.⁶

Why the compromise?

- Conventional spherical (SPH) and aspherical (AS) FSV designs have relatively few parameters of optimization, therefore optical compromises must be made in order to achieve the level of flatness demanded by lens wearers.
- Assessing the quality of optics in SV/FSV lenses is complex. Lens power is typically measured in the centre, but attention is rarely paid to optical performance and vision clarity across the entire lens.

100 %
agree

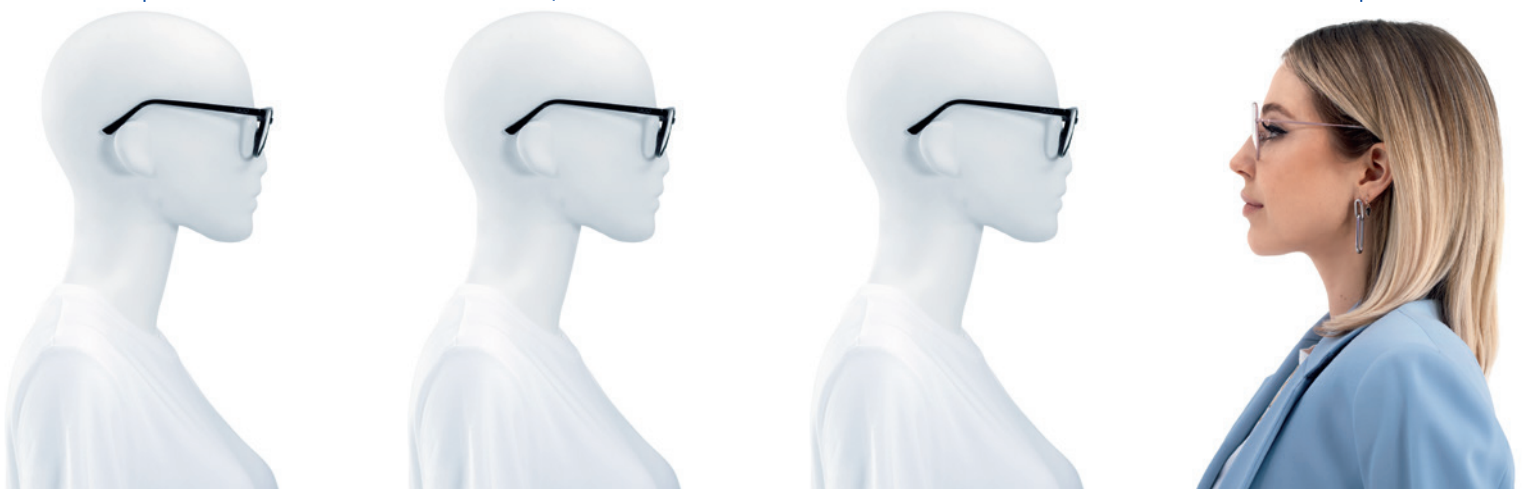
'It is important
that my lenses
offer comfortable
vision across the
entire lens.'

90 %
agree

'It's important for me
to see clearly across
the entire lens.'

**Good
news**

ZEISS tackled the big opportunity for
optical improvement of conventional
SV lens designs by identifying a method
to evaluate optical quality and advance
lens optimization of SV lenses.



Standard, Good, Better, Best.

Standard

**Spherical (SPH)
SV Lenses**



- Optimized by using **only 1 free parameter** in the lens radius.
- Peripheral rays are more strongly refracted than rays at lens centre (spherical aberrations) resulting in optical compromise.
- Any acceptably flat lens results in peripheral blur for the wearer.

Good

**Aspherical (AS)
SV Lenses**



- Optimized by using **5 free parameters** in one meridian.
- One aspherical surface, usually on the front, but the back surface remains a simple toric (2 spheres at 90°).
- Provides optics similar to SPH, while improving on flatness.
- When sph and cyl power increase, the same constraints result in increasing optical errors.

Better

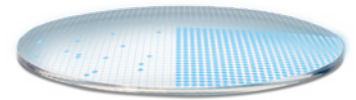
**Double Aspherical
(DAS) SV Lenses**



- Optimized using **9 free parameters** in two perpendicular meridians and blended in between.
- Replaces the toric back surface of an AS with 2 aspherical shapes perpendicular to each other (atoric).
- Improvement on an AS design, but blended area still compromises the optics.

Best

**Freeform
SV Lenses**

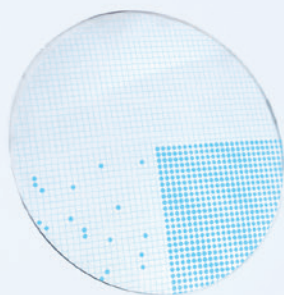


- Point-by-point lens design optimization using **>700 free parameters**.
- Highly complex lens surface to **overcome the optical compromises** inherent in SPH, AS, DAS.
- The result is a SV lens that is both **very flat and thin and achieves excellent optics** – with clear viewing from the lens centre to the periphery.



ZEISS ClearView SV Lenses.

A breakthrough in optics and aesthetics.



Freeform SV lenses with point-by-point optimization.

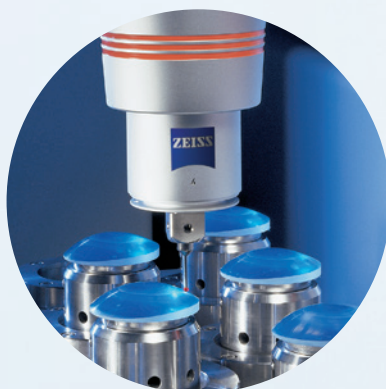
The advanced freeform lens design in ZEISS ClearView SV/FSV Lenses uses point-by-point optimization across the lens surface. The optical power is optimized for the wearer from the lens centre to the periphery using 700 free calculation parameters. This special freeform design is created especially for use in the standard single vision category, for FSV and SV surfaced lenses without Rx compensated, and is the maximum level of optimization possible when the individual position of wear is unknown.

CORE technology – an advanced eye model for the first time in ZEISS FSV and standard SV surfaced lenses.

A high myope typically has a 4mm longer eyeball than an emmetrope. As individual eyeballs differ in geometry, the so-called centre of rotation (CoR) varies by prescription. Assuming an accurate location of the CoR in the lens design therefore plays a key role for the visual comfort of the wearer – allowing them to see clearly in the lens periphery. The change in CoR location for wearers of high plus through to high minus lenses is taken into account in the lens design with CORE Technology. ZEISS lens designers have optimized a sophisticated algorithm to integrate CORE Technology in ClearView SV Lenses.

ZEISS Vision Clarity Simulation

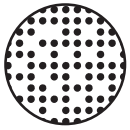
Building on extensive knowledge in industrial metrology, ZEISS has now developed a methodology that overcomes typical assessment limitations and allows a true evaluation of the optical performance of a finished single vision lens, from the centre to the periphery.



*CMM –
Assessment
of optical
performance*

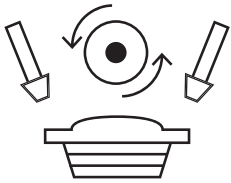
ZEISS ClearForm technology.

The process that brings Freeform designs to finished stock lenses.



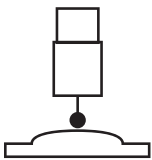
ZEISS ClearView lens design

Optic lens design experts in ZEISS Research and Development use complex mathematical simulation tools to design sophisticated freeform optics for ZEISS ClearView FSV Lenses. This is transferred into the mould designs required in manufacturing.



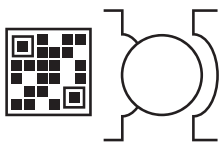
Freeform mould generation

Numerically controlled (CNC) mould generators use special cutting tools that contain millions of diamond particles. These can produce virtually any mould shape with a very high degree of accuracy. The highly complex freeform shape used in ZEISS ClearView FSV Lenses is incorporated into lens moulds through this process. The worked mould surface is then polished to a very high lustre using high-speed rotating polishing spheres, that are also dynamically CNC controlled, to ensure the final cast lens will be of the highest optical quality.



CMM metrology measurement

Using ZEISS' industrial metrology expertise, final moulds are checked for accuracy and precision with a coordinate measuring machine (CMM) where over 1500 points on the surface of each mould are analyzed.



Specialised mould pairing

Special optimization of front and back mould pairings in the lens casting process means the complex freeform optics are delivered across all of the prescription range with efficiency and without optical compromise. 2D Data Matrix Code (DMC) is used in the manufacturing process to precisely track moulds and lenses as part of an automated industry 4.0 process.

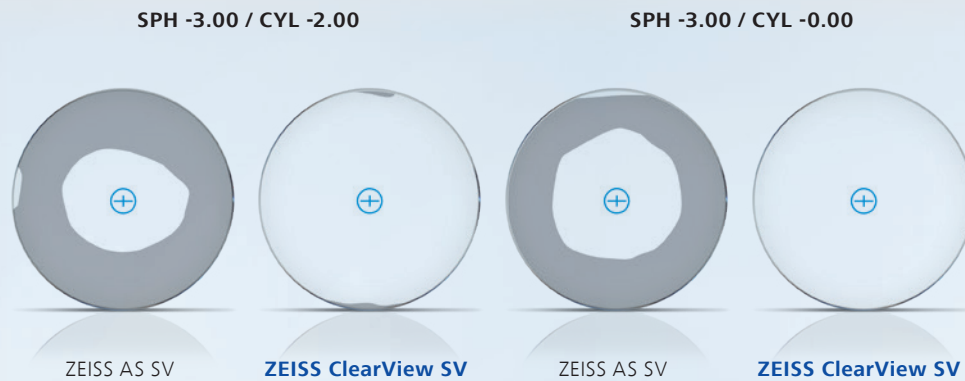


Casting / Coating / Quality checks

Finally, finished lenses are checked by means of CMM against the ZEISS Vision Clarity Simulation to ensure the final product delivers on the optical promise.

On average 3x larger zone of excellent clear vision – across the entire lens.¹

Visual clarity simulations across a wide range of prescriptions show that, on average, ZEISS ClearView FSV Lenses provide a 3x larger zone of excellent vision clarity when compared to regular ZEISS aspherical (AS) FSV lenses. This clear zone is up to 4.6x larger for higher myopic prescriptions and up to 5.1x larger for higher hyperope prescriptions.¹



* FSV lens measurements shown

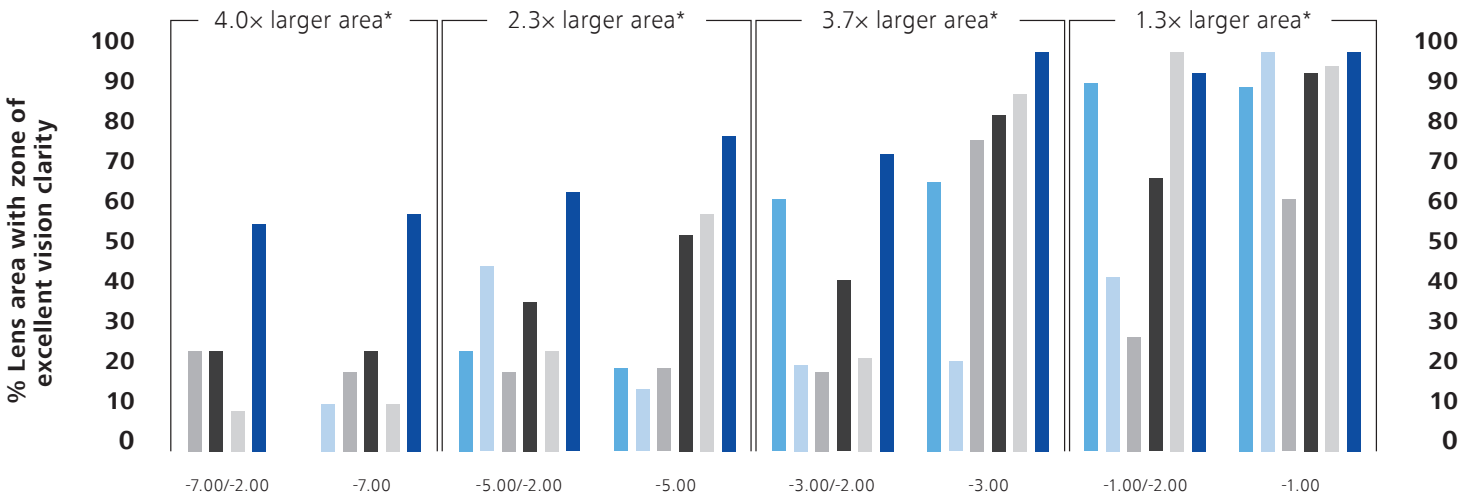
The zone of excellent vision clarity is defined as a continuous circular area of unblurred vision on the lens – below the threshold of just noticeable blur.

This means clear vision over a larger area of the lens for all single vision lens wearers, allowing greater comfort.

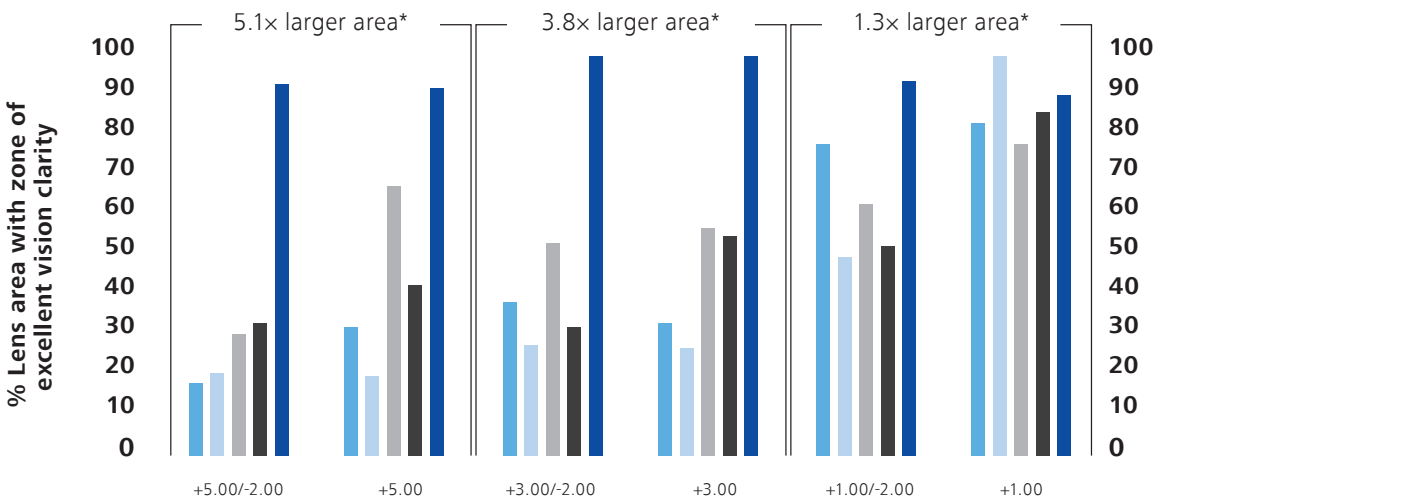


The improvement in optical performance of ZEISS ClearView SV Lenses is evident when compared to ZEISS SPH and AS SV lenses, as well as AS and DAS SV from other major branded lens suppliers.^{7,8}

Optical Performance of Single Vision Lenses (1.60) in the minus range



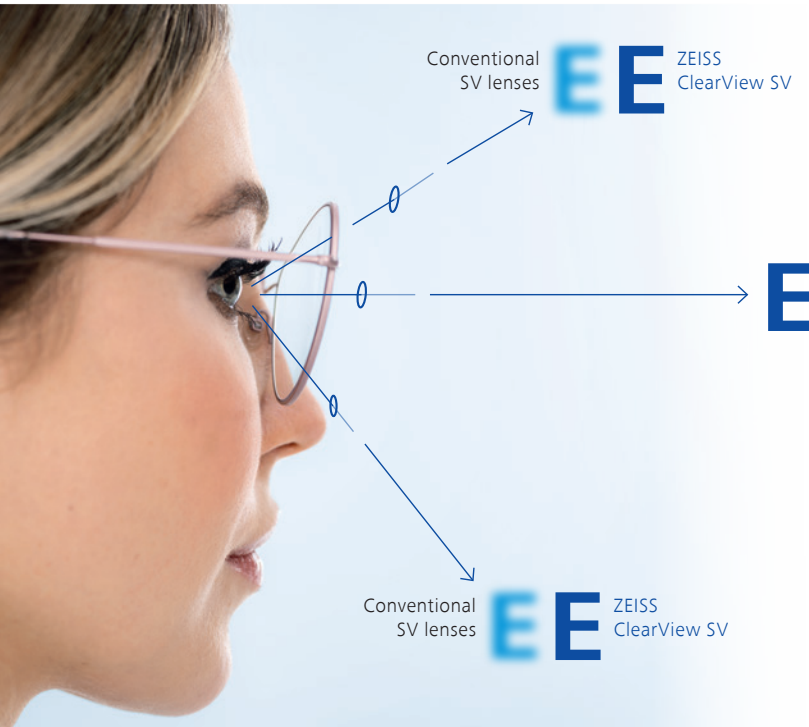
Optical Performance of Single Vision Lenses (1.60) in the plus range



■ SPH FSV (Previous ZEISS)
 ■ AS FSV (Previous ZEISS)
 ■ AS FSV (Major Lens Company A)
 ■ AS FSV (Major Lens Company B)
 ■ DAS FSV (Major Lens Company C)
 ■ ZEISS ClearView FSV

*compared to previous ZEISS AS FSV Lenses

Without compromising optics, ZEISS ClearView SV Lenses...



With typical SV lens designs, the drive for flatter and thinner lenses compromise optical performance, especially in the lens periphery.

Conventional SV lens designs must 'choose' between optics and aesthetics. In doing so, they compromise optics in order to achieve an acceptable lens in terms of thickness and curvature.

With ZEISS ClearView SV Lenses, wearers can experience excellent vision clarity in a lens that is flatter and thinner than aspherical (AS) or spherical (SPH) SV lens designs.

The technological advances in ZEISS ClearView SV Lenses allow for flatter, more attractive lenses, by reducing the curvature without compromising vision clarity in the lens periphery.

...are very flat and very thin.

ZEISS ClearView SV Lenses are on average 36 % flatter across all prescriptions⁴ when compared to ZEISS AS 1.6 FSV lenses.

⊖ Lenses

Point-by-point optimization and ClearForm[®] manufacturing technology by ZEISS allow for flatter minus lenses with a thickness reduction at the lens edge. When compared to ZEISS AS 1.6 FSV, ZEISS ClearView Lenses are up to 49% flatter for the minus range⁵ (Figure 1).

⊕ Lenses

When it comes to plus lenses which are thicker in the lens centre, ZEISS ClearView 1.6 SV Lenses are:

- up to 25% flatter⁹
- on average 8% thinner at the lens centre, and
- up to 13% thinner at the lens centre for a +5.00D high sphere power when compared to ZEISS SPH 1.6 FSV lenses (Figure 1).

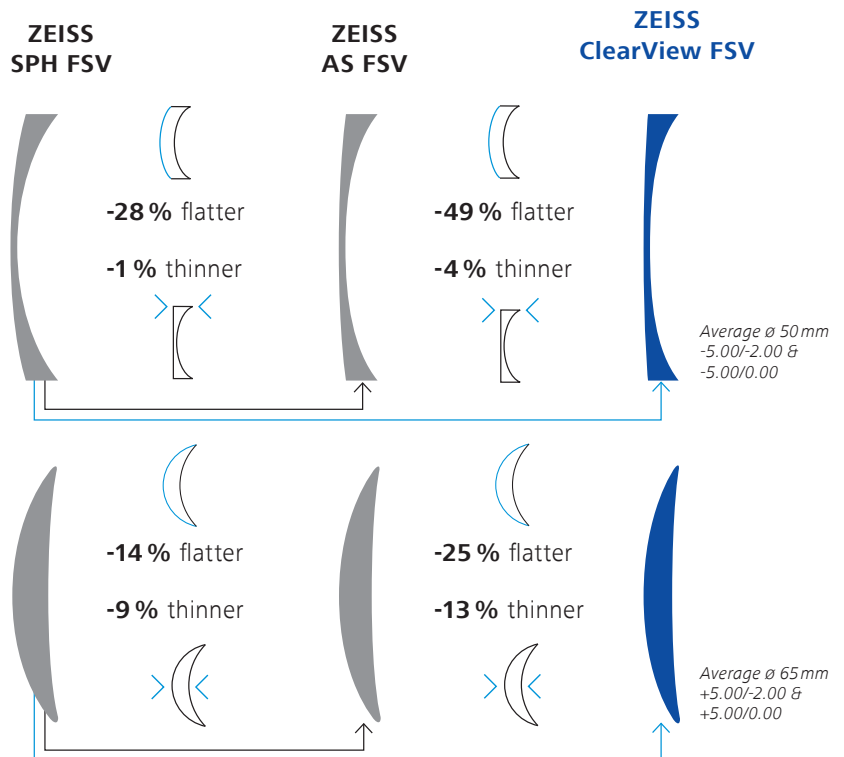


Figure 1. Values for lens flatness and lens thickness of ZEISS ClearView 1.60 FSV and ZEISS AS 1.60 FSV compared to ZEISS SPH 1.60 FSV averaged for -5D and +5D with and without cylinder of -2D.

It is definitely not standard. Lens wearers agree.

ZEISS ClearView SV Lenses are proven superior to conventional SV lenses.^{6,10}

This internal wearer trial was ClearView SV, vs AS FSV.
The larger external wearer trial was ClearView FSV vs AS FSV.

After 1 week of 'blind testing':

78% preferred the vision performance of ZEISS ClearView FSV compared to ZEISS AS SV.⁶

89% strongly agreed/agreed that they had **experienced all-day visual comfort** with ZEISS ClearView SV.⁶

79% strongly agreed/agreed that ZEISS ClearView FSV provides a **clear view across the entire lens for near, intermediate and distance vision.**⁶

In a larger external double-blind test, run by an eye hospital*:

87% of wearers with both **moderate sphere and cylinder power** preferred ZEISS ClearView FSV to ZEISS AS FSV.¹⁰

2:1 wearers with prescriptions of **moderate cylinder** (1.25D to 3.00D) preferred ZEISS ClearView FSV to ZEISS AS FSV.¹⁰

Wearers with **moderate sphere power** (< -5.00D) preferred ZEISS ClearView FSV lenses to ZEISS AS FSV by almost **2:1**.¹⁰

* Tianjin Eye Hospital, Optometric center, 15# Sipingdong RD, Heping District, Tianjin, China, 300020

References

- 1 Based on a visual clarity simulation on a 50 mm diameter lens area for 1.60 index ZEISS ClearView FSV Lenses compared to 1.60 ZEISS AS FSV Lenses. Average of +5D, +3D, +1D, -1D, -3D, -5D and -7D with and without a cylinder of -2D. Quantitative analyzes by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 2 Measurements of lens thickness on 1.60 ZEISS ClearView FSV Lenses compared to 1.60 ZEISS SPH FSV Lenses over a range of prescriptions (-5D, -3D, -1D, +1D, +3D, +5D with and without cyl -2D). Maximum reduction of 16% for centre thickness of +5.00/-2.00. Quantitative analyzes by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 3 Measurements of lens thickness (edge thickness at 50 mm diameter for minus lenses; centre thickness for plus lenses) on 1.60 ZEISS ClearView FSV Lenses compared to 1.60 ZEISS AS FSV Lenses over a range of prescriptions (-7D, -5D, -3D, -1D, +1D, +3D, +5D with and without cyl -2D). Maximum reduction of 8% for centre thickness of +3.00/0.00. Quantitative analyzes by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 4 Measurements of lens flatness (base curve) on 1.60 ZEISS ClearView FSV Lenses compared to 1.60 ZEISS SPH FSV Lenses over a range of prescriptions (-5D, -3D, -1D, +1D, +3D, +5D with and without cyl -2D). Maximum reduction of 49% of -5.00D with and without cyl -2D. Quantitative analyzes by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 5 Measurements of lens flatness (base curve) on 1.60 ZEISS ClearView FSV Lenses compared to 1.60 ZEISS AS FSV Lenses over a range of prescriptions (-7D, -5D, -3D, -1D, +1D, +3D, +5D with and without cyl -2D). Maximum reduction of 32% for -5.00D with cyl -2D. Quantitative analyzes by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 6 Study participants were asked to rate how important different aspects ("price", "to see clearly across the entire lens", "easy to adapt to", "comfortable vision across the entire lens", "aesthetics", "available coatings", "matches the frame") are for them, when choosing new eye glass lenses. Wearer trial comparing 1.60 ZEISS ClearView FSV and 1.60 ZEISS AS FSV in a laboratory setup and in everyday life. N=18 study participants. Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 7 Based on a visual clarity simulation on a 50 mm diameter lens area for 1.60 index ZEISS ClearView FSV Lenses compared to 1.60 ZEISS AS FSV Lenses over a range of prescriptions (+5D, +3D, +1D, -1D, -3D, -5D and -7D with and without a cylinder of -2D). Quantitative analyzes by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 8 Based on a visual clarity simulation on a 50 mm diameter lens area for 1.60 index ZEISS ClearView Finished Single Vision lenses and typical branded finished single vision lenses. Average of -1D, -3D, -5D and -7D with and without -2D cyl. Quantitative analyzes by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 9 Measurements of lens flatness (base curve) on 1.60 ZEISS ClearView FSV Lenses compared to ZEISS SPH FSV Lenses. Average of -5D, -3D, -1D, +1D, +3D, +5D with and without cyl -2D. Maximum reduction of 49% of -5.00D with and without -2D cyl for minus lenses. Maximum reduction of 25% of 5.00D with and without -2D cyl for plus lenses. Quantitative analyzes by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.
- 10 External wearer trial 2021, comparing 1.60 ZEISS ClearView FSV and 1.60 ZEISS AS FSV by Tianjin Eye Hospital, Tianjin, China, test in laboratory setup and feedback on everyday life use. N=185 study participants aged between 19 and 42 (power range between -8.00 D and +1.25 D with 0D to -3.00 D cyl). 58 wearers with average sphere power < -5.00D, 33 wearers with average cyl power below -1.25, and 15 wearers with prescriptions below -5.00D sph and -1.25 D cyl.
- 11 (400nm) ZEISS UVProtect lenses provide >99.8% UV Protection to 400 nm, evaluated from UV Transmittance measurements across entire UV spectrum to 400nm against AS1067.2:2016
- 12 (40%) Inhouse measurements and calculations based on the BVB (Blue-Violet-Block) metric. Analysis by Technology and Innovation, Carl Zeiss Vision GmbH, 2020
- 13 (50%) Inhouse measurements and calculations based on the DBRLED (Digital Blue Light Reflection) metric. Analysis by Technology and Innovation, Carl Zeiss Vision GmbH, 2020
- 14 Tested by ISO 21702:2019(E) for enveloped viruses and tested by ISO 22196:2011(E) for Gram-negative and Gram-positive bacteria. Efficacy proven after 24 hours as defined by ISO standards.

ZEISS ClearView Lenses

Contact your ZEISS sales agent or visit

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for more information.



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Seeing beyond