

# Supporting Your Vision with Japanese Quality



Daily disposable soft contact lens for presbyopia

SEED 1dayPure™  
シード ワンデーピュア イードフ EDof™

# The First Japanese Manufactured Extended Depth-Of-Focus (EDOF) Contact Lens\*

There is an increasing number of presbyopes wearing contact lenses today. SEED has been striving to meet their demands for good vision at all visual distances regardless of environment, so they can see clearly for every occasion. Working jointly with the Brien Holden Vision Institute, a world-renowned research institution, SEED is now able to offer an innovative contact lenses for presbyopia. Designed and developed based on a unique theory, the SEED 1dayPure EDOF provides presbyopes of all ages a contact lens that delivers on the vision promise.

\*SEED 1dayPure EDOF was approved as a contact lens based on the principle of extended depth-of-focus (EDOF). It is the first EDOF contact lens available in the Japanese market.



Founder of Brien Holden  
Vision Institute

BHVI is a non-profit translational research, education and public health organisation affiliated with the University of New South Wales in Sydney, Australia, developing new solutions for vision care, especially for myopia and other refractive errors. It is leading global professional education and advocacy efforts to address the myopia epidemic. This time, BHVI has developed extended depth of focus (EDOF) technology for the treatment of presbyopia. This technology provides good vision at all distances, while minimising ghosting and haloes.



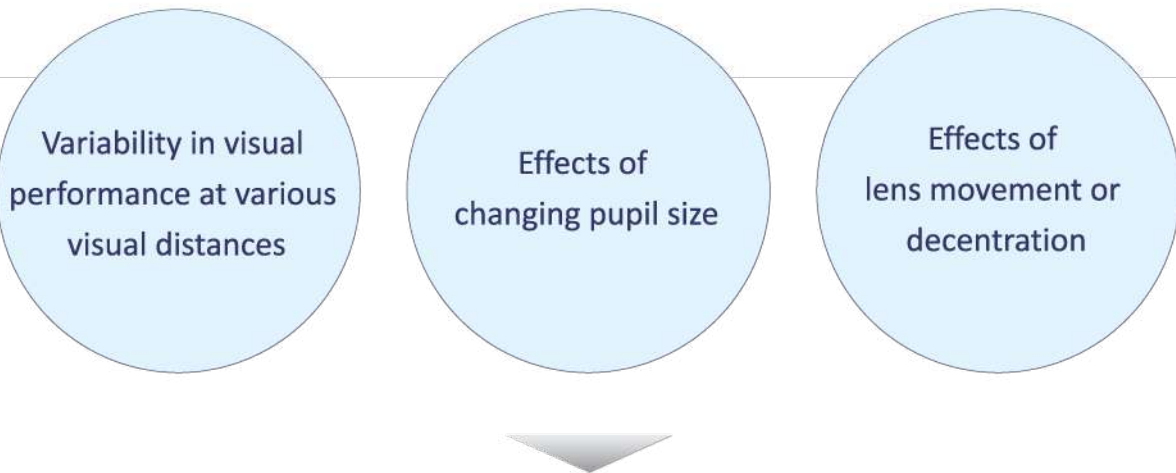


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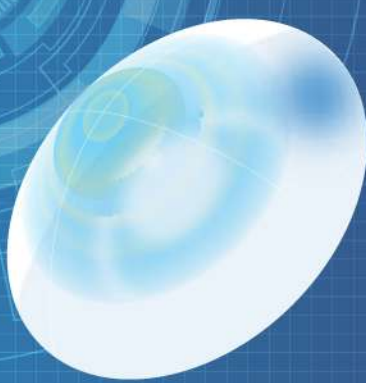
## Shortcomings of Conventional Bifocal Contact Lenses

Factors such as varying visual distances and changing pupil size can affect the stability of visual performance of conventional bifocal contact lenses.



How can we create lenses that provide stable visual performance under a broad range of visual conditions?

「SEED 1dayPure EDOF」



### EDOF Lens Design

The Brien Holden Vision Institute and SEED have developed and commercialised an algorithm that unlocks the full potential of optical characteristics (lens performance) and visual properties (visual acuity for users). Applying this special algorithm to lens design, we have developed a unique EDOF lens that minimises variability in visual performance at varying visual distances, the major limitation of conventional bifocal contact lenses. The EDOF lens also provides good perceived image quality under a broad range of conditions.

\*Illustration of lens design



## Good Vision at All Visual Distances

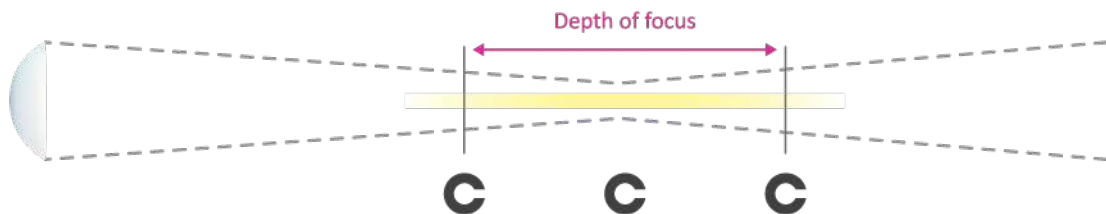
# EDOF

## Extended Depth Of Focus

Depth of focus refers to the range of distances over which one perceives images to be in satisfactory focus.  
 Extended depth-of-focus lenses provide good perceived image quality at all distances throughout the range of depth of focus.

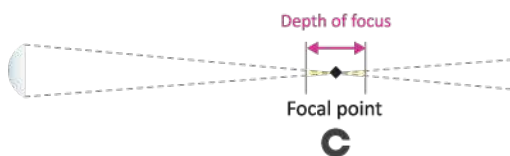
### An illustration of EDOF

#### ● EDOF lens (SEED 1dayPure EDOF)



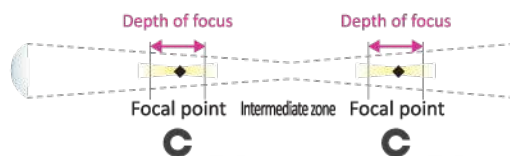
Extended depth of focus (EDOF) allows lens wearers to perceive images to be continuously in focus over a wide range of visual distances, from near to far.

#### ● Single vision lens



A single vision lens has a single focal point for optimal focus. Lens wearers also perceive images to be in focus around this focal point (depth of focus).

#### ● Bifocal lens



A bifocal lens has two focal points for optimal focus. Lens users perceive focused images at each focal point and within their depths of focus, while images at intermediate distances are perceived as out of focus.

With a design based on the EDOF theory, the SEED 1dayPure EDOF contact lens provides good perceived image quality at all distances throughout the range of depth of focus.




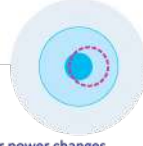

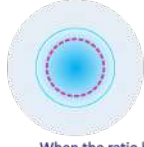





Wearers can expect stable visual performance  
 at all visual distances, from near to far.

## Stable Visual Performance in Every Condition

### Effects of changing pupil size and lens decentration

 : Pupil size   
  : Contact lens  
 : Near power   
  : Distance power

	Under normal condition (With good lens fitting and normal pupil size)	Under dim lighting (With dilated pupil)	With poor lens stability (With decentered lens)
<b>Bifocal lens</b> 		 When the ratio between the distance and near power changes, visual performance is affected by the increased peripheral region of the lens.	
<b>Progressive multifocal lens</b> 		 When the ratio between the distance and near power changes, visual performance is affected by the increased peripheral region of the lens.	
<b>SEED 1dayPure EDOF</b> 		 Visual performance is less affected by the peripheral region of the lens, thanks to the unique lens design featuring "combinations of higher order aberrations" optimising vision across distance, intermediate, and near.	

SEED 1dayPure EDOF lens is characterised by a combination of multiple higher order aberrations tuned to optimise retinal image quality over a wide range of viewing distances, pupil sizes and decentrations.

### <Summary>

	Bifocal lens	Progressive multifocal lens	SEED 1dayPure EDOF
Visual performance with changing pupil size	Moderate	Moderate	Good
Visual performance with lens decentration	Moderate	Moderate	Good



Users can expect stable visual performance under various conditions.

## Simulated Images of Visual Performance

### ■ Simulated images of visual performance of SEED 1dayPure EDOF

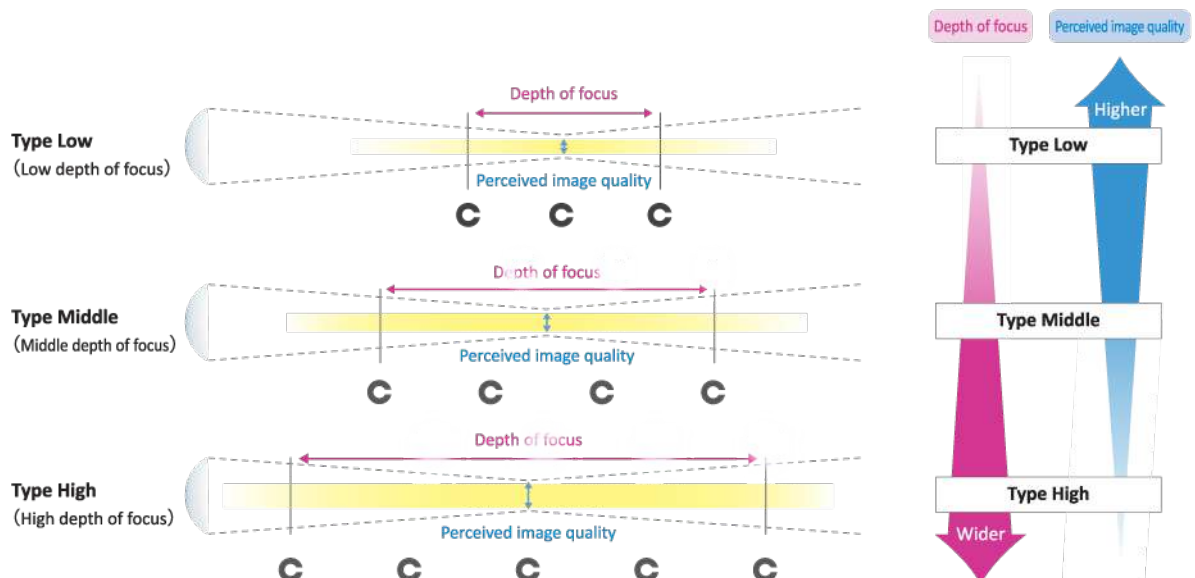
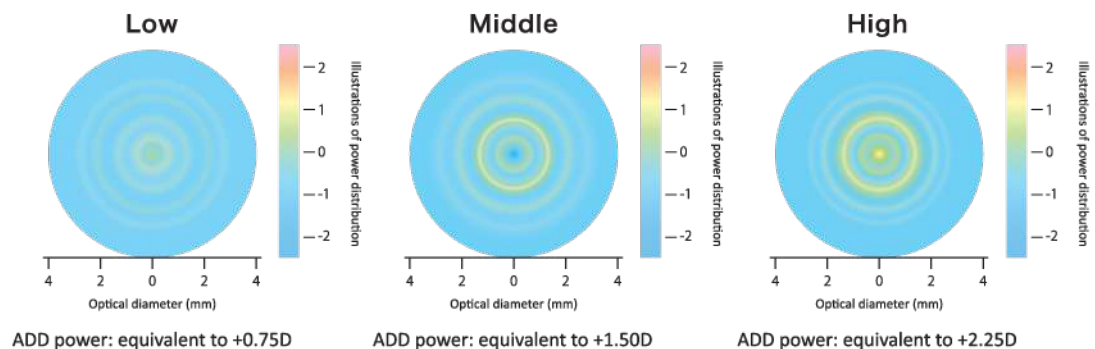


Extended depth-of-focus provides stable visual performance over a wide range of visual distances, from near to far.

## Three Lens Designs for Three Different Depth-of-Focus Ranges

To meet a patient's extensive needs we provide three lens designs for three different depth-of-focus ranges. Each lens design features extended depth of focus and provides the power distribution needed to minimise perceived image quality deterioration.

### ■ Illustrations of power distribution



While a lens of the high depth-of-focus type offers the widest range of depth of focus, perceived image quality is best with the low depth-of-focus type.



# Fitting Guide for Presbyopia

## 1. Patient selection

### Ideal presbyopic candidates for SEED 1dayPure EDOF

- Refractive cylinder  $\leq 1.00D$
- Do not have excessive demands and expectations on vision

### Presbyopes who might not achieve successful contact lens wear

- Critical or very fine visual demands at both distance and near
- Refractive cylinder  $> 1.00D$  (any axis) in one or both eyes
- Monocular distance VA poorer than 6/12 with spherical equivalent refractive correction
- Pupil size  $< 2.5$  mm in mesopic conditions (e.g., standard clinic room illumination)
- Abnormal binocular sensory function (e.g., amblyopia or strabismus)
- With the expectation to discard and never wear spectacles again, even for special tasks or viewing conditions

## 2. Initial lens selection

### Step 1. Determine the contact lens power

Perform refraction, calculate the spherical equivalent and determine the contact lens prescription after vertex correction.

SEED 1dayPure EDOF may not provide satisfactory vision for patients with refractive cylinder  $> 1.00D$ .

### Step 2. Determine the near addition

With the patient wearing full correction for distance, determine near addition based on patient's reading needs (magazine, smartphone, tablet, etc.)

### Step 3. Determine the dominant eye (Table 1)

Alternate blur method preferable.

### Step 4. Choose appropriate lens

Based on Rx determined above, choose the appropriate lens design (see Table 2) and insert lenses.

### Step 5. Let the lenses settle

Allow 10 minutes for lenses to settle. Take the patient into the waiting area and suggest reading a magazine and looking out of the window so the patient has a chance to experience the lenses outside the test room.

### Step 6. Confirm the distance and near vision

Assess binocular vision and monocular vision.

To improve distance VA, add  $-0.25D$  to dominant eye or both eyes.

To improve near VA, add  $+0.25D$  to non-dominant eye or both eyes.



**Table 1: Determining dominant eye using alternate blur**

- Place a +1.50D spheric trial lens over each eye alternately while the patient is wearing best corrected distance Rx and looking at smallest subjectively detectable line on 6 metre letter chart.
- The eye that is looking through the +1.50D lens with less reported blurriness (more comfortable vision) is the non-dominant eye.
- Try other tests such as the pointing method, or the triangle method if this method does not work for the patient.

**Table 2: Determining the type of SEED 1dayPure EDOF based on near addition**

Near addition (D)	Dominant eye	Non-dominant eye
Up to +1.25	Type Low	Type Low
+1.50 to +1.75	Type Middle	Type Middle
+2.00 to +2.50	Type High	Type Middle

### Over-refraction and troubleshooting tips

- Reverse the designs on the eyes if a patient is having trouble adapting, as some patients might not have strong eye dominance.
- Do not use a phoropter as it does not reflect the natural head posture, direction of gaze, and pupil size of patients.
- If in doubt between two consecutive lens powers, choose the more positive power.

## 3. Lens fit assessment and lens dispense

If the lens shows good fit with good centration, sufficient movement, good comfort and satisfactory visual acuity, dispense lenses to the patient.

## Features of the SIB Material

"SIB" stands for SEED Ionic Bond, a zwitterionic material. Every pair of SEED PURE series contact lenses is made from original "SIB" material. It contains both positive and negative ions, resulting in electrical stability. This stability keeps out dust and impurities, while ensuring high biocompatibility.

### Moisture Retention

The moisture in lenses is classified into two types: evaporative free water and non-evaporative bond water. Zwitterionic material "SIB", which contains both positive and negative ions, attracts moisture more firmly. Thus, the ratio of bonding water in "SIB" is higher than that in other anionic high water content lenses. Therefore, even if the overall water content is equal to conventional anionic lenses, "SEED 1dayPure EDOF" is assumed to prevent evaporation of water more effectively.

### UV Absorber

SEED 1dayPure EDOF contains UV absorber. Contact lens with UV absorber reduces the transmission of harmful UV rays.

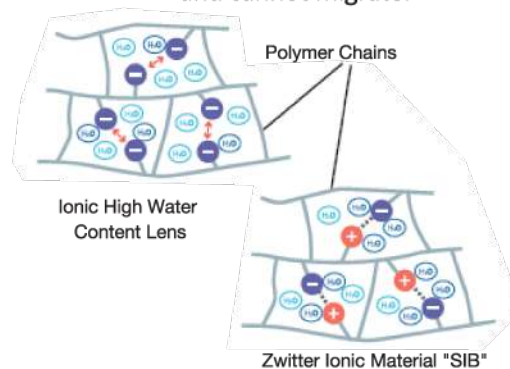
### High Contamination Resistance

Although zwitterionic material "SIB" is ionic and has high water content, it has the advantage of keeping away the proteins, which cause deposits formation.

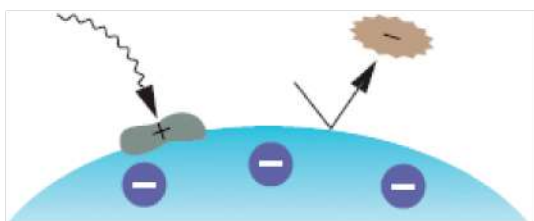
### Image of free water and bond water

**H<sub>2</sub>O** Free water: Water molecules which can migrate in the polymer network freely.

**H<sub>2</sub>O** Bond water: Water molecules which are binding to the polymer network, and cannot migrate.



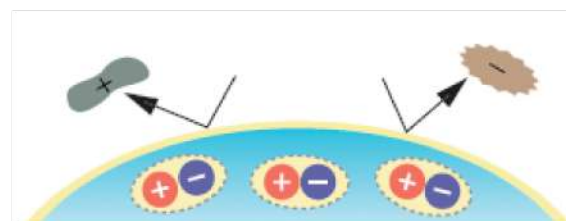
### Image of deposits resistance



The cross section of the lens

### Conventional Ionic Lens

The negative ions in the material strongly repel each other, hence making the lens surface negatively charged. Therefore, it attracts the positively charged deposits, e.g. proteins.



The cross section of the lens

### Zwitterionic Material "SIB"

There are equimolar amounts of positive and negative ions in the material. Thus, the lens surface is neutrally charged. Therefore, it does not attract positively charged deposits, e.g. proteins.

## User-friendly Features

### Fingertip Closure Design

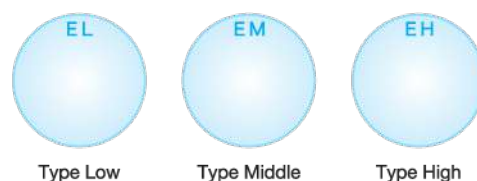
Wearers can open the package easily and close it with a touch of a finger. This eliminates the need for hand contact and is a more hygienic way of handling the box.

### 32 Lenses in One Box

SEED 1dayPure EDOF has 32 pieces of lenses in one box. Even with extra 2 pieces of lenses, SEED's packaging is just as compact as other boxes containing 30 pieces of lenses.

### Lens Marking

To help users distinguish between the inside and outside faces, 1 marker can be found on every lens to ensure the easy handling and safe usage of SEED 1dayPure EDOF.





## High-quality Production

### ■ High-performance and Eco-friendly Facility

All the manufacturing processes of "SEED 1dayPure EDOF" are strictly managed at SEED Kounosu laboratory. Great care is taken in producing each pair of SEED contact lens at the manufacturing plant in order to ensure the utmost safety for human eyes. SEED also takes its environmental responsibility seriously and ensure its facilities to be eco-friendly.

## Product Outline

### ● Lens Physicality

Product Name	SEED 1dayPure EDOF
Brand Name	SEED 1dayPure EDOF
Modality	Daily disposable
FDA Group	Group IV
Lens Material	Bio-ionic bio-hydrogel
Colouring Agent	Phthalocyanine pigment
Handling Tint	Blue
UV Absorber	Benzotriazole
Oxygen Permeability (Dk)	$30.0 \times 10^{-11} (\text{cm}^2/\text{sec}) \cdot (\text{mLO}_2/(\text{mL} \times \text{mmHg}))$
Oxygen Transmittance (Dk/t)	$42.9 \times 10^{-9} (\text{cm}/\text{sec}) \cdot (\text{mLO}_2/(\text{mL} \times \text{mmHg}))$ (-3.00D)
Refraction Index	1.406
Luminous Transmittance	98%
Water Content	58%
Manufacturing Method	Cast mold method

### ● Lens Specifications

Base Curve	8.40mm
Power	+5.00D~-12.00D (0.25D step)
Extended Depth of Focus (EDOF)	Low (Low Depth of Focus) Middle (Middle Depth of Focus) High (High Depth of Focus)
Diameter	14.2mm
Centre Thickness	0.07mm (-3.00D)
Lens Mark	Low: "EL" Middle: "EM" High: "EH"
Package	32 lenses in one box



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