



## Fact Sheet

### ZEISS BlueGuard

<b>What is ZEISS BlueGuard?</b>	ZEISS BlueGuard Lenses are the latest innovation from ZEISS in blue light protection. Designed for our “new normal” world that has resulted in spending more time exposed to artificial light sources that emit a relatively high intensity of blue light. Using the latest organic-chemical technology, ZEISS BlueGuard Lenses are an “in-material” solution, blocking up to 40% of potentially harmful blue light in the wavelength between 400 and 455 nanometer (nm). <sup>1</sup> Based on proven UVProtect technology, ZEISS BlueGuard Lenses additionally ensure full protection from ultraviolet radiation (UV) up to 400 nm.
<b>What are the main benefits of ZEISS BlueGuard Lenses?</b>	ZEISS BlueGuard is based on three pillars: <ol style="list-style-type: none"><li>1) More protection: Blocks a significant part of blue light in the wavelength range from 400 to 455 nm, while providing full UV protection up to 400 nm.</li><li>2) Easy on the eyes: ZEISS BlueGuard Lenses block a part of the blue light that could intensify symptoms of digital eye strain.</li><li>3) Less reflection: As blue light blocking properties are incorporated into the lens material, ZEISS BlueGuard Lenses come standard with ZEISS DuraVision Platinum UV. This premium anti-reflection coating with its subtle blue residual reflection ensures the wearer does not get annoyed by irritating reflections and the eyes are clearly visible behind the lenses.</li></ol>
<b>Why is ZEISS presenting a new solution for blue light protection?</b>	Accelerated by the global COVID-19 pandemic, the use of digital devices is high. At the same time, the awareness of digital blue light is increasing. As a result, many people are concerned about the possible effects on their eyes or have already experienced symptoms indicating digital eye strain.  Besides, online conferences and virtual meetings are increasingly shaping today's professional life. ZEISS BlueGuard Lenses therefore reduce reflections on the lenses and thus ensure more appealing aesthetics.

<sup>1</sup> Inhouse measurements and calculations based on the BVB (Blue-Violet-Blocking) metric. Analyses by Technology and Innovation, Carl Zeiss Vision International GmbH, DE, 2020.



<p><b>Where is the difference to ZEISS DuraVision BlueProtect?</b></p>	<p>Blue light blocking coatings are designed to block blue light by reflecting it, which is why its residual reflections are higher. The reflection on the lens surface can cause cosmetic irritation to observers and may distract the wearer, creating visual disturbance. Especially indoors, when displays or light-emitting diodes (LED) are the main sources of illumination, these reflections tend to be more visible and become obvious.</p> <p>As blue light blocking properties are incorporated into the lens material, ZEISS BlueGuard Lenses come standard with DuraVision Platinum UV anti-reflective coating. This premium anti-reflection coating with its subtle blue residual reflection ensures the wearer does not get annoyed by irritating reflections and the eyes are clearly visible behind the lenses. Compared to the current blue light coating ZEISS DuraVision BlueProtect, the reflections of digital blue light are reduced by up to 50%.<sup>2</sup> This gets more relevant today when we spend more times in front of digital devices, e.g. when participating in video calls and online meetings.</p>
<p><b>What is blue light?</b></p>	<p>Some portion of the electromagnetic spectrum is generating signals and perception in the human visual system. This part is called visible radiation light and encompasses the band of approx. 380nm (blue - violet) to approx. 780nm (red). The blue light band between 380 and 500 nm represents an essential part of the spectrum that is relevant to e.g. high-contrast vision and various physiological processes.</p> <p>Basically, there are two different types of blue light: the natural blue light of the sun and artificial blue light e.g. emitted by LED lamps, energy-saving lights as well as smartphone and computer displays.</p>
<p><b>Do we need blue light for normal vision?</b></p>	<p>Blue light is of paramount importance for a normal and rich color vision and high contrast vision.</p>
<p><b>Can blue light cause damage to the eyes?</b></p>	<p>The relatively high levels of energy inherent in the comparatively short wavelengths of blue light have been shown to impact metabolic processes in retinal cells. It is quite possible that excessive exposure to blue light can lead to retinal damage. However, it is still part of medical research to better determine what dose and what specific light sources have a significant damage-causing potential. While people should be careful when exposed to intense sunlight, there are positive news for those who are exposed to digital devices, displays, monitors or normal lighting. In fact, there</p>

<sup>2</sup> Inhouse measurements and calculations based on the DBR<sub>LED</sub> (Digital Blue Light Reflection) metric. Analyses by Technology and Innovation, Carl Zeiss Vision International GmbH, DE, 2020.



	<p>is currently no evidence from patient studies that these devices pose a health risk to the retina.</p> <p>Nevertheless, patient complaints of decreased visual comfort, asthenopic symptoms such as blurred vision, burning, painful or tired eyes, and eyestrain are common and familiar topics to eye care professionals.</p>
<p><b>What protection does ZEISS BlueGuard offer?</b></p>	<p>In addition to ZEISS UVProtect Technology, ZEISS BlueGuard Lenses offer protection by integrating new blue light blocking technology into the lens material, blocking up to 40 percent<sup>3</sup> of potentially harmful and irritating blue light in the wavelength range between 400 nm and 455 nm – the ISO defined upper limit of maximum blue light phototoxicity.<sup>4</sup> This includes part of the blue light spectrum, which could intensify the symptoms of digital eye strain.</p> <p>The positive effects of blue light, for example, which influence general well-being in a higher wavelength range of around 455 to 500 nm, remain unaffected by ZEISS BlueGuard.</p>
<p><b>What is digital eye strain?</b></p>	<p>Digital eye strain (DES) is a scientifically accepted syndrome with various symptoms associated with extensive use of digital blue light. Symptoms mentioned in relation to DES are glare/dazzle, discomfort, blurred vision, accommodation stress and dysfunction, fixation disparity, pain in or around the eyes, dryness and eye fatigue.<sup>5</sup> In the past, DES was related to a reduced reading distance and font size based on smaller displays of digital devices. Now, research shows that digital eye strain can be caused by digital blue light and can lead to corresponding symptoms such as glare and blurred vision.</p>
<p><b>How does ZEISS BlueGuard address digital eye strain?</b></p>	<p>Extensive exposure to artificial blue light can lead to symptoms like blurred vision and visual discomfort, which can also play a role in the perception of digital eye strain.</p> <p>Digital devices and LEDs emit a disproportionately high amount of blue light compared to previous light sources such as incandescent bulbs. Shorter wavelength blue light can induce opto-physical effects while entering the eye on its way through the ocular media to the retina. The two main effects are wavelength-dependent light scatter and longitudinal chromatic aberration.</p> <p>ZEISS BlueGuard Lenses are designed to counteract these negative effects of blue light and thus reduce digital visual stress. In doing so,</p>

<sup>3</sup> Inhouse measurements and calculations based on the BVB (Blue-Violet-Blocking) metric. Analyses by Technology and Innovation, Carl Zeiss Vision International GmbH, DE, 2020.

<sup>4</sup> ISO/TR 20772:2018-10, Ophthalmic optics - Spectacle lenses - Short wavelength visible solar radiation and the eye.

<sup>5</sup> Sheppard A.L., Wolffsohn J.S. (2018). Digital eye strain: prevalence, measurement and amelioration BMJ Open Ophthalmology, BMJ Journals.



	they master the complex challenge of balancing the positive and negative characteristics of blue light by, on the one hand, blocking up to 40 percent of the blue-violet spectrum between 400 and 455 nm and, on the other hand, leaving the positive effects of higher-wavelength blue light in a range of 455 to 500 nm unaffected. <sup>6</sup>
<b>For whom is ZEISS BlueGuard recommended?</b>	In general, ZEISS BlueGuard Lenses provide a comfortable all-day solution for all people frequently exposed to blue light from digital devices or interior lighting – as well as for anyone who already experiences symptoms of digital eye strain.
<b>How will ZEISS BlueGuard benefit consumers?</b>	Besides facing potentially harmful blue light emitted by the sun, most consumers are increasingly exposed to artificial blue light. ZEISS BlueGuard Lenses provide blue light blocking and full UV protection in clear lenses. The in-material solution offers an excellent balance between protection, clarity and visual comfort, designed for the digital lifestyle and the increasing amount of time spent at home.  At the same time, reflections on the lens surface are significantly reduced, which means that the eyes are more visible behind the lenses. This results in a better appearance in the online as well as in the offline environment.
<b>How will ZEISS BlueGuard benefit eye care professionals?</b>	ZEISS BlueGuard is the next generation of blue light protection that helps eye care professionals to provide best patient care in the new normal era.  With the increasing use of digital devices and the growing amount of time spent at home, blue light protection is becoming more and more familiar to consumers. Eye care professionals are now able to offer a product that blocks a part of blue light and at the same time provides fewer irritating reflections on the lens surface due to the in-material solution.
<b>When will ZEISS BlueGuard be launched?</b>	The worldwide launch starts in April 2021.
<b>Availability</b>	ZEISS BlueGuard is suitable for all ages and available in a wide range of lens designs and in all plastic lens materials.  Except and not available for Bifocal and Trifocal Lenses, DriveSafe Lenses, Sports Lenses and ZEISS Myopia Management Lens Solutions.

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<sup>6</sup> Inhouse measurements and calculations based on the BVB (Blue-Violet-Blocking) metric. Analyses by Technology and Innovation, Carl Zeiss Vision International GmbH, DE, 2020.