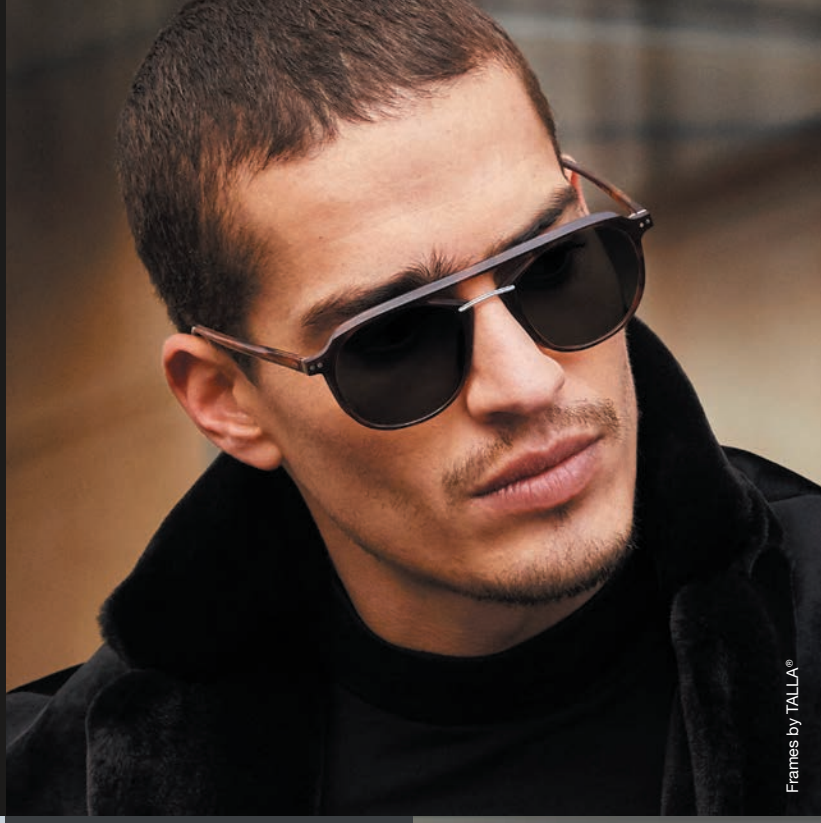
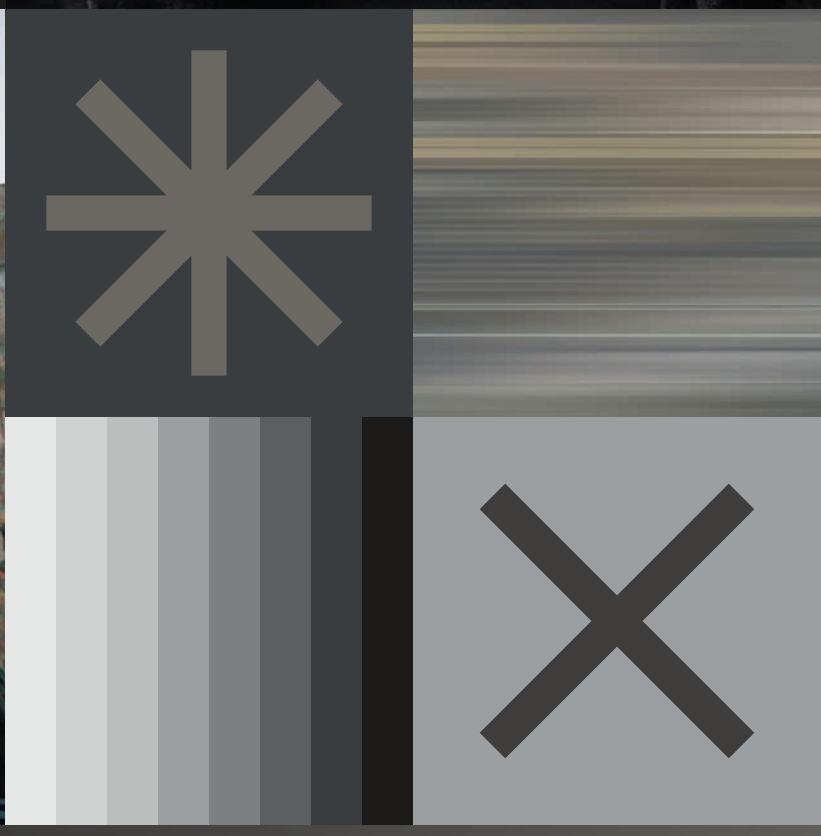
XTRACTIVE®
POLARIZED™

THE ONLY AND BEST EVER PHOTOCHROMIC POLARIZED LENS

Compared to clear to dark photochromic lenses.





Transitions™

Light
Intelligent
Lenses

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Light is an essential and dynamic presence, constantly moving and changing in all of our daily lives.

Different types of light create challenges to our vision. **In very demanding light situations**, such as **very bright light** or **reflective glare**, our vision can be compromised creating a poor experience.

Exposure to these types of light situations can also amplify daily eye fatigue, contributing to associated symptoms such as dry eyes, itchy eyes, headache and eye strain. In the long term, **repetitive exposure** to intense light can create a **cumulative effect** and could have an **impact on eye health**.

Therefore, it is even more important for eyeglass wearers who are frequently exposed to **very bright light** and **reflective light situations** to seek protection solutions.

Thanks to its unique advanced technology *Transitions*® *XTRActive*® *Polarized*™ lenses can help satisfy the most demanding of wearers.

1. NEED FOR EXTRA LIGHT PROTECTION

Some light situations, like bright light or reflective glare, can be more challenging for our eyes than others.

These challenging lights can impact our immediate vision in the moment of exposure and over time. Long term, cumulative exposure to UV and blue light, for example, can damage our eyes and impact our vision[4]. This is why wearers who are frequently exposed to bright light or reflective glare situations can greatly benefit from extra light protection.

VERY BRIGHT LIGHT

Very bright light, specifically intense sunlight outdoors, is something we all experience throughout the year.

For some, either by their location or their lifestyle, they are more frequently exposed to bright light and would benefit from a higher level of protection. Every light situation has a specific level of lux, which is how light intensity is measured. There are a variety of activities that can lead to bright light exposure and impact our vision experience such as hiking in nature, relaxing at the beach and even commuting in the city.

Regardless of a wearer's level of light sensitivity, there are specific bright light environments that they can be exposed to frequently where they would benefit from having **extra protection.**[11]

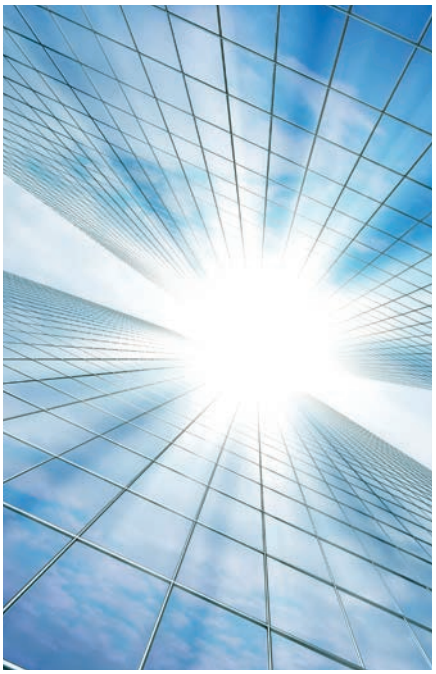
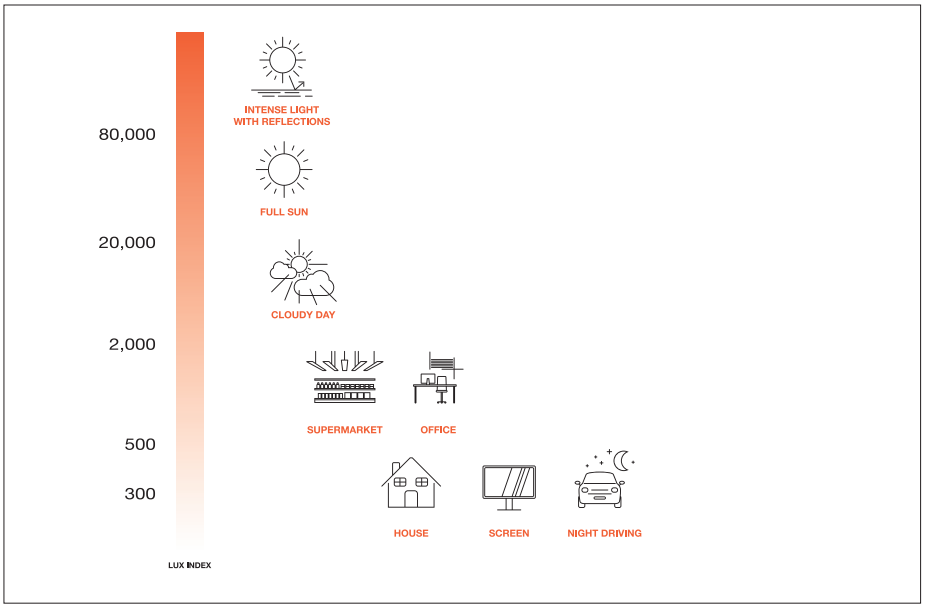


Figure 1: Different levels of light intensity

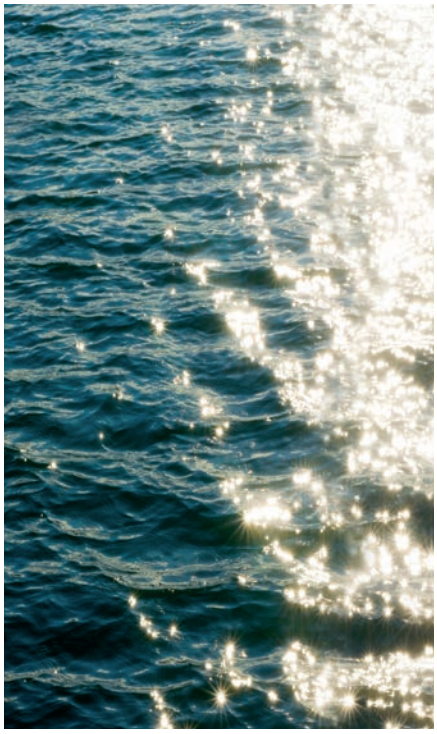


Very bright light can have a lasting impact on our vision and eye health. Cumulative exposure, even at moderate intensities, can generate daily eye fatigue and impact the long-term health of our eyes by accelerating the aging and/or oxidative damage of the cornea, the crystalline lens and retinal cells.

In the short and immediate term, bright lights can cause momentary periods of blindness when we go from dim to very bright areas (light adaptation), or when faced with intense reflective lights. The latter can leave us with afterimages even when the reflections stop.

NEED FOR EXTRA LIGHT PROTECTION

REFLECTIVE GLARE

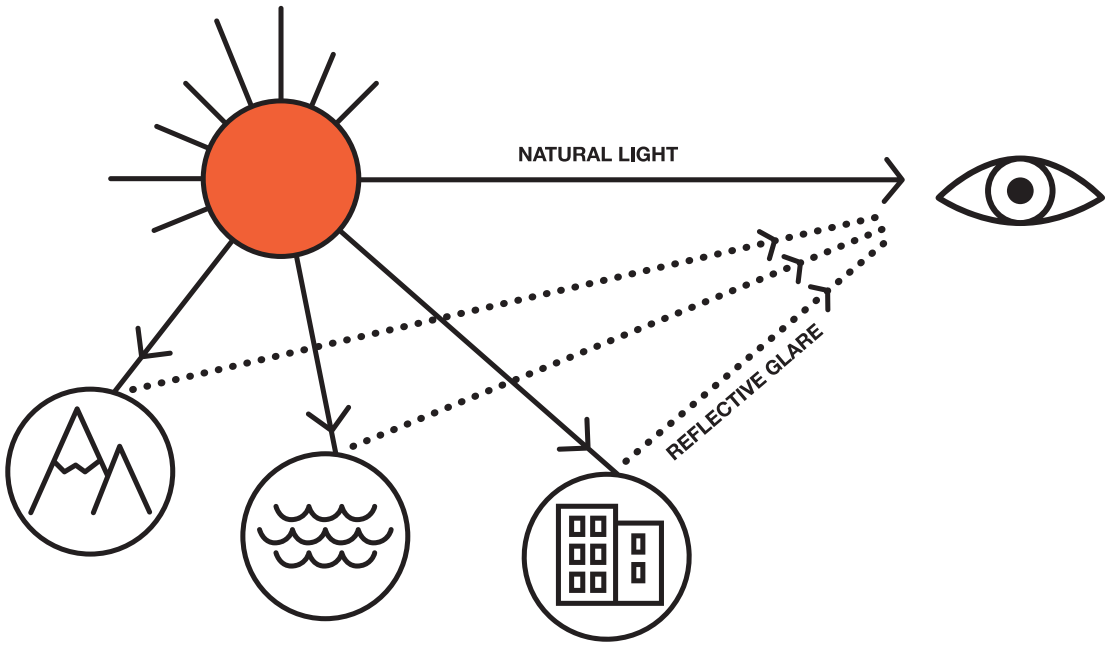


Reflective glare is a reflection of incident light that partially or totally obscures the details that can be seen on a surface by reducing the contrast.

This type of light is most commonly experienced outdoors in light situations influenced by smooth, shiny surfaces found in nature such as water, snow, and sand, and in urban environments such as glass, car windows, concrete, metal, and buildings.

Reflective glare is particularly challenging because reflection **amplifies the quantity of light** that hits the eyes. These concentrated, dazzling reflections go directly into the eye, often resulting in discomfort and momentarily impairing vision. Who hasn't been caught by surprise from a reflection of sunlight on a window or car, making you lose sight for a few seconds?

Figure 2: what is reflective glare?



SIGHT POLLUTION

Sight pollution refers to the impact of our landscape on our ability to enjoy the view.

Sight pollution is created by light coming from different directions, intensities and sources all at the same time towards the eyes and therefore can compromise our vision.

Sight pollution can consist of bothersome intense light and reflective glare caused by ads, signage, buildings, artificial lights, and other human constructions in our modern environment.

30% **of people experience sight pollution every day[6]**

NEED FOR EXTRA LIGHT PROTECTION

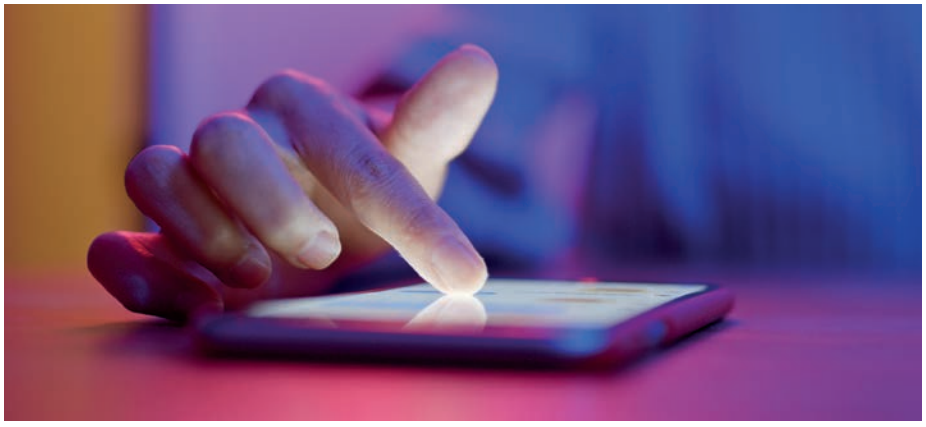
HARMFUL BLUE LIGHT

Our modern lives can amplify our struggle with light, especially the effects of blue light.

We spend more time on our screens and that time has only increased with the pandemic for more than 66% of us worldwide[7]—as we continue to rely on screens for work, entertainment, and connection. Unlike natural sunlight which maintains a balance across the spectrum, many of today's devices utilize lights—like LEDs and screens—that have an **unbalanced spectrum,** with a high ratio of blue light, which may **accelerate symptoms of vision fatigue, dry eye, and blurred vision.**[5, 8]

However, it is not only screens that we should be aware of. There is also a high quantity of blue light in bright light and intense glare.

Lots of research have been carried out on the cumulative effect of blue light. Scientists are currently exploring the impact of blue light on retinal cells and on **long-term eye health.**



WORLDWIDE, PEOPLE DECLARE:[7]

75%
protecting their eyes from UV and harmful blue light is more important than ever.

66%
spending more time on screens than before the pandemic

69%
eyeglasses are important for my eye health

UV PROTECTION

People put on sunglasses on sunny days because they feel the need to protect their eyes and they simply want to see well.

But it is important to understand that protecting your eyes from the sun - specifically UV rays - is vital as it has been proven that long-term exposure to UV can damage the eyes.
The sun is present in the sky even on cloudy days, so your eyes benefit from UV protection no matter what the weather.

Without protection, a portion of UVA rays can still penetrate your eyes down to your retina, while UVB rays that do not penetrate as deeply can still cause cataracts and macular degeneration. UVB rays can also contribute to short term effects such as photokeratitis, which is essentially a corneal sunburn[4].

LIGHT SENSITIVITY

Light protection is even more relevant now as our behaviors have fundamentally changed as a result of the pandemic.

In fact, in the US **38%** of consumers declare they spent more time outdoors[9]. Among them, **54%** have experienced issues including headaches, watery eyes, difficulty seeing well in bright sun
and eye strain[9].

It is no surprise that **9** out of **10** eyeglasses wearers are light sensitive[10]. Moreover, **3** out of **10** eyeglasses wearers are very light sensitive[6]. They experience real and painful symptoms on average **2.2** times more than others[3].

Transitions XTRActive Polarized **lenses help provide a level of extra protection for wearers who are very sensitive to light or more frequently exposed to bright light.**

NEW *XTRACTIVE POLARIZED* LENSES

2. NEW *TRANSITIONS XTRACTIVE POLARIZED*

The only and best ever photochromic polarized lenses[1].

EXTRA LIGHT PROTECTION

Transitions XTRActive Polarized lenses are **uniquely designed** for eyeglass wearers who are **frequently exposed to bright light** and **reflective glare.** These wearers place a **premium on good vision performance** and don't want to be caught by surprise by **glare**, suffer **eye strain** or experience **poor vision in brightly lit areas.**

OUTDOORS

Specially designed for **very bright light** and **reflective glare** exposure, *Transitions XTRActive Polarized* lenses become **extra dark**[11] and **polarized** at the same time when they activate outdoors.

Transitions XTRActive Polarized lenses achieve **a polarization efficiency of up to 90 percent** outdoors[12], which is similar to polarized sunglasses. They block 100% of UV and are extra dark[11].

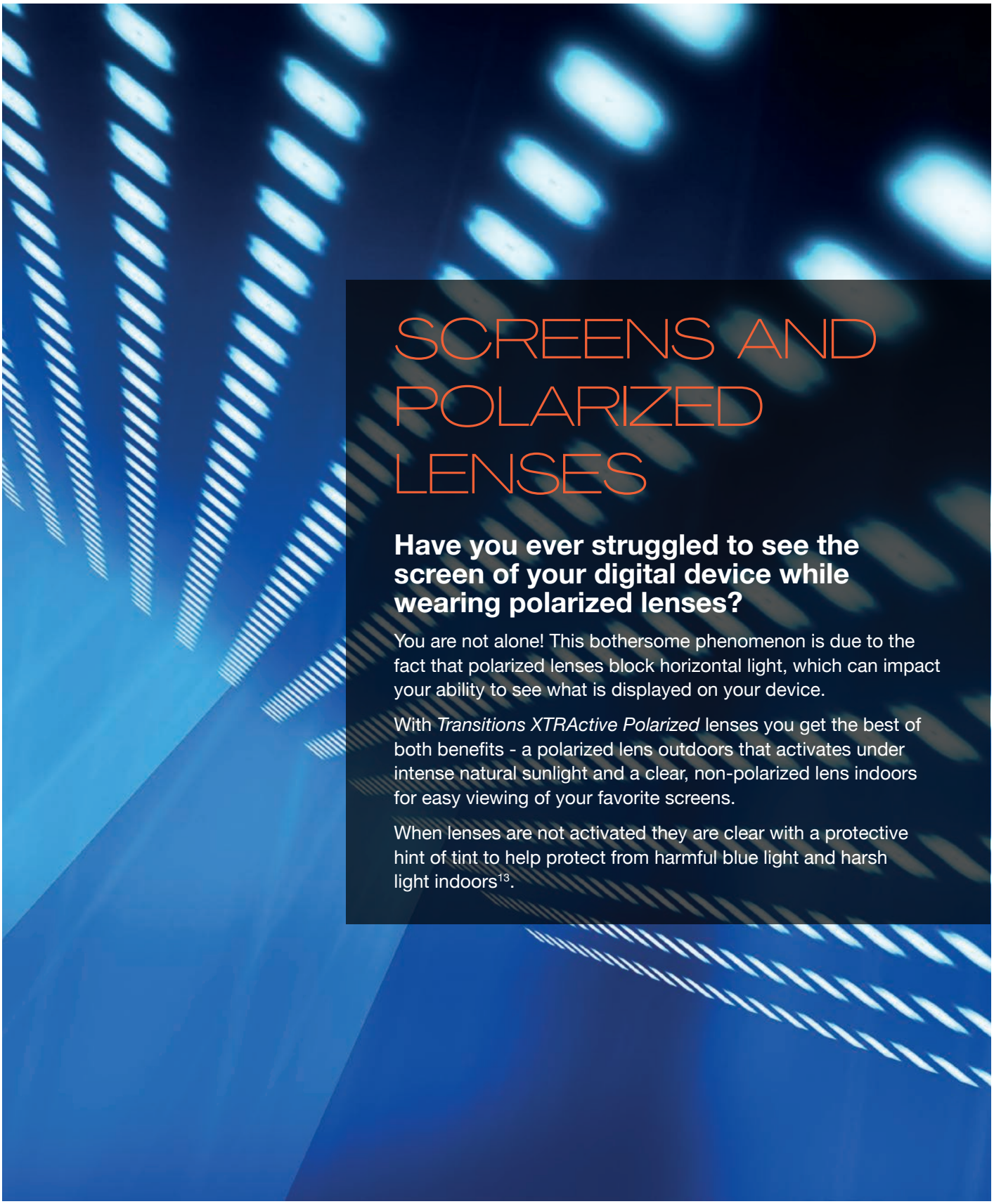
Where wearers need blue light protection the most, *Transitions XTRActive Polarized* lenses filter up to **90% of blue light outdoors**[13].

IN THE CAR

In the car, lenses absorb visible light and then activate behind the windshield according to the light intensity[14]. But they do not get polarized since the windshield blocks UV.

INDOORS

Indoors, under lower light intensity, *Transitions XTRActive Polarized* lenses remain clear with a hint of protective tint. *Transitions XTRActive Polarized* lenses do not activate indoors, neither for darkness nor for polarization. As a result, the wearer can use their digital devices without having to worry about a polarized lens blocking their view of the screen and still receive the benefit of T*ransitions XTRActive Polarized* lenses ability to **help protect from harsh indoors lights,** filtering up to **34% of harmful blue light indoors[13].**



SCREENS AND POLARIZED LENSES

Have you ever struggled to see the screen of your digital device while wearing polarized lenses?

You are not alone! This bothersome phenomenon is due to the fact that polarized lenses block horizontal light, which can impact your ability to see what is displayed on your device.

With *Transitions XTRActive Polarized* lenses you get the best of both benefits - a polarized lens outdoors that activates under intense natural sunlight and a clear, non-polarized lens indoors for easy viewing of your favorite screens.

When lenses are not activated they are clear with a protective hint of tint to help protect from harmful blue light and harsh light indoors[13].

A NEW DIMENSION OF VISION EXPERIENCE

LARGER VIEW [15]

Our eyes are naturally attracted to reflections caused by light. It is perhaps unsurprising that light attracts the eye as light is energy, and the eye contains energy sensors that are activated by light. But when our eyes look toward a bright light or reflective glare, the visibility is compromised and the field of vision is reduced as if there was a white shadow on a part of our vision. Limited visibility can represent a risk (i.e. when driving or crossing a road).

With *Transitions XTRActive Polarized* lenses, we experience less glare and your eyes are less bothered by light resulting in a wider field of vision. This can provide a significant reduction in the percentage of time we spend looking at glare.

By reducing glare *Transitions XTRActive Polarized* lenses help **improve visibility up to 33% more than non-polarized sun lenses[18].**

SHARPER VISION [15]

Sunlight can be absorbed or reflected in several different directions. When sunlight is bouncing off horizontal surfaces such as water, land, or the hood of a car, it creates reflections. Those reflections produce an agitating source of glare that causes visual discomfort and potentially blinding glare. *Transitions XTRActive Polarized* lenses are unique in that they allow only vertically oriented light to pass through the lens and block the horizontally oriented light so that glare is almost reduced or eliminated depending on lens activated darkness level. This blocks the horizontally oriented light so that glare is almost eliminated. *Transitions XTRActive Polarized* lenses help to reduce the glare created by the sun, empowering the wearers to see through reflective surfaces such as a window, water, or snow. *Transitions XTRActive Polarized* lenses reduce the glare enabling the wearer to have sharper vision.

VIVID COLORS [15]

Glare distorts the true color of objects and makes them harder to distinguish. This is because tiny particles within the air can dim colors, giving them a white, yellow or grey overcast especially in humid or polluted environments. *Transitions XTRActive Polarized* lenses reduce the reflections from those particles, so colors can retain their deep natural appearance. It can be a real visual treat to see deep blue skies, crystal clear water, and colors of a landscape more naturally when wearing *Transitions XTRActive Polarized* lenses. **The polarization properties of *Transitions XTRActive Polarized* lenses make the world 30% more colorful.[19]**

3. UNIQUE ADVANCED TECHNOLOGY

Building on many years of research and development in photochromics and polarization technology, Transitions Optical has engineered the world's only and best ever photochromic polarized lens[1].

This new, exclusive technology is supported by over 400 patents[16] globally covering the chemistry, matrix, dyes, equipment, manufacturing process and the final product. It is truly a unique, complex, cutting edge and one-of-a-kind technology that represents an exciting new chapter in the *Transitions XTRActive* product range and wearers experience thanks to an unmatched proprietary technology owned by Transitions Optical.

EXCLUSIVE MULTI-LAYER MATRIX

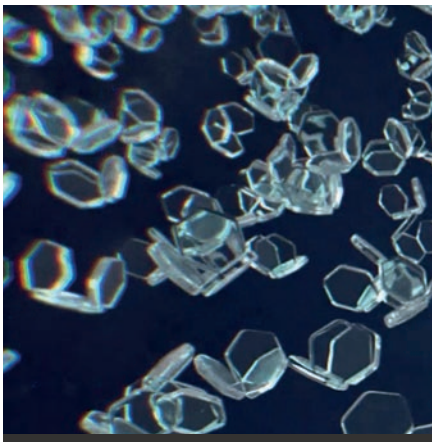
Transitions XTRActive Polarized lenses utilize a new exclusive multi-layer matrix. This new photochromic system represents a technological breakthrough for the photochromic category.

By optimizing the environment of each layer, significant improvements in the photochromic system were achieved, resulting in a technology that activates and fades back faster while also improving **extra darkness, durability** and the ability to **polarize.** To achieve high polarization efficiency[12] and faster fadeback at the same time, the matrix has been reinvented. This is because these two performance characteristics require a matrix with opposite properties. The invention of novel materials was a breakthrough designed to break the paradigm between high polarization efficiency and fast fadeback[12]. Thanks to this invention, *Transitions XTRActive Polarized* lenses are able to maximize the performance of a new set of **Transitions XTRActive dyes** for **extra darkness** and **ultra-fast dichroic dyes for dynamic polarization.**

NEW *XTRACTIVE* DYES

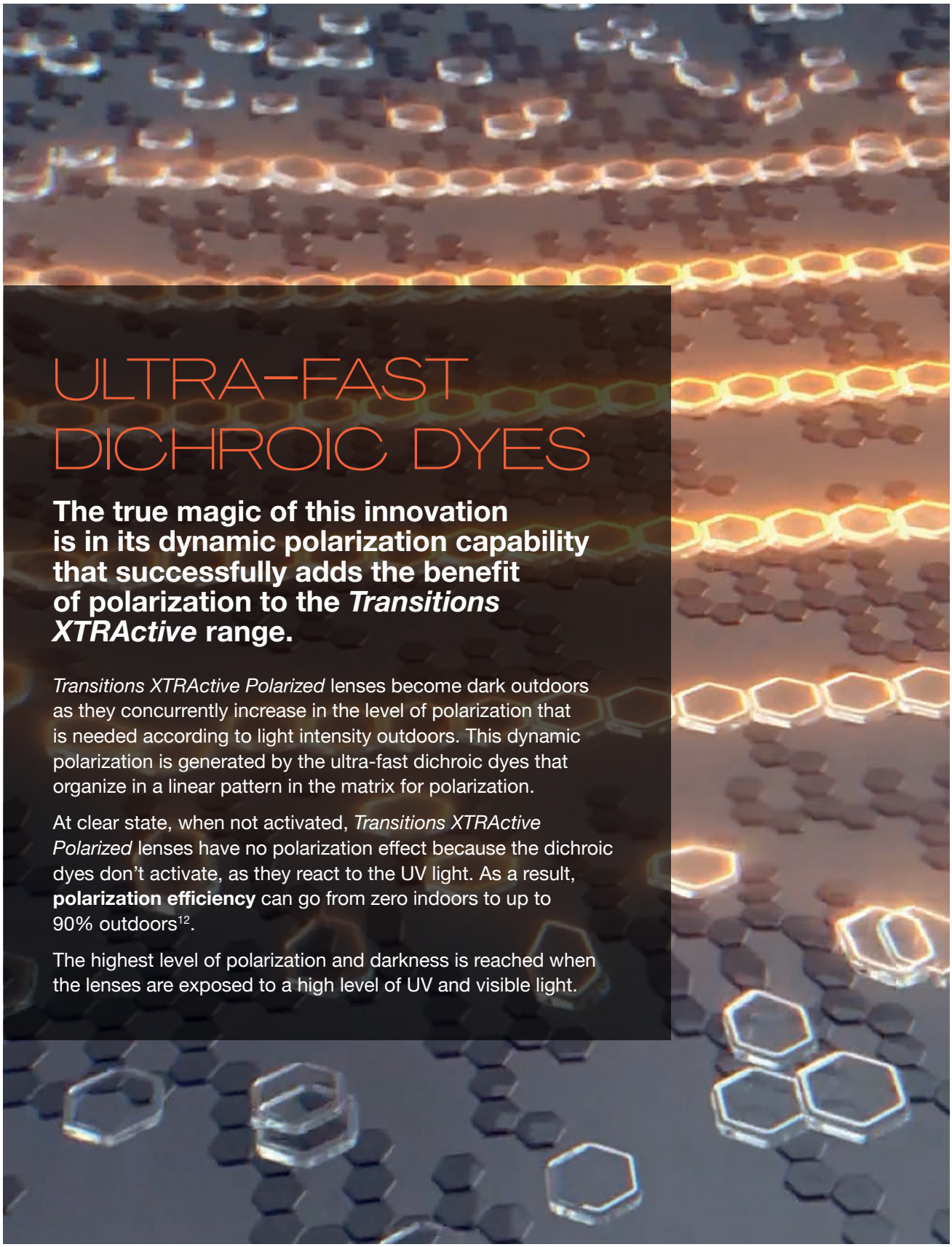
New *Transitions XTRActive* dyes are powered by a broader spectrum of both UV and visible light to deliver their full potential and become extra dark[11] and extra powerful.

These new dyes are clear indoors with a hint of protective tint and outdoors capture more light energy to get extra dark and even activate in the car[14].



***Transitions XTRActive Polarized* lenses are part of the Transitions XTRActive range as they provide extra darkness and extra protection to the wearer.**

A UNIQUE ADVANCED TECHNOLOGY



ULTRA-FAST DICHROIC DYES

The true magic of this innovation is in its dynamic polarization capability that successfully adds the benefit of polarization to the *Transitions XTRActive* range.

Transitions XTRActive Polarized lenses become dark outdoors as they concurrently increase in the level of polarization that is needed according to light intensity outdoors. This dynamic polarization is generated by the ultra-fast dichroic dyes that organize in a linear pattern in the matrix for polarization.

At clear state, when not activated, *Transitions XTRActive Polarized* lenses have no polarization effect because the dichroic dyes don't activate, as they react to the UV light. As a result, **polarization efficiency** can go from zero indoors to up to 90% outdoors[12].

The highest level of polarization and darkness is reached when the lenses are exposed to a high level of UV and visible light.

THE ONLY AND BEST EVER PHOTOCHROMIC POLARIZED LENS[1]

Until the breakthrough launch of Transitions Vantage™ lenses in 2012, dynamic polarization was just a “what if” concept.

This first generation innovation pioneered an entirely new category of photochromics and remained in this unique category all by itself - until now.
Transitions XTRActive Polarized lenses are not a generational change - they are an evolutionary leap achieved from incredible advancements in dynamic polarization technology and new breakthroughs in *Transitions XTRActive* performance.
Compared to *Transitions Vantage,* they are:

- Darker[11]
- Higher level of polarization efficiency[12]
- Up to 2X faster to fadeback[20]
- Clearer[20]

As *Transitions XTRActive Polarized* lenses are rolled-out, *Transitions Vantage* lenses will be phased out.

WHAT IS DYNAMIC POLARIZATION?

Transitions XTRActive Polarized lenses are clear and un-polarized indoors and polarized outdoors and all in-between stages of activation depending on the environment.

The photochromic dyes in *Transitions XTRActive Polarized lenses* not only darken, they also get polarized. The polarization efficiency and darkness increase and decrease together in relation to the intensity of UV light exposure. So as they darken they become more polarized and as they fadeback they become less polarized.

Dynamic polarization clearly breaks the paradigm of conventional polarization and traditional photochromics.

Frames by TALLA®

KEY TAKEAWAYS

***Transitions XTRActive Polarized* lenses are the only and best ever photochromic polarized lenses to defy glare[1].**

- *Transitions XTRActive Polarized lenses* are designed for wearers who want extra protection in high-glare situations. The unique polarization technology reduces glare outdoors, providing a better vision experience with a **sharper vision, a larger field of view and bright, vivid colors[15].**
- *Transitions XTRActive Polarized lenses* use a breakthrough, **exclusive, multi-layer matrix** which hosts new **Transitions XTRActive broad-spectrum dyes** for more darkness and **new ultra-fast dichroic dyes** that are especially tuned to high-glare light and when activated have the unique ability to organize into a pattern on the lens itself for polarization.
- *Transitions XTRActive Polarized lenses* are **clear with a hint of tint** to help protect from harmful blue light indoors[13]. They also **activate in the car[14]** to help protect you anytime, anywhere. Once the lenses are fully activated, thanks to UV and visible light, they achieve extra darkness and **polarize outdoors in the sun.**
- Outside, *Transitions XTRActive Polarized lenses* achieve a **polarization efficiency of up to 90 percent[12],** which is similar to polarized sunglasses.
- The **dynamic polarization** of *Transitions XTRActive Polarized lenses*, helps to protect wearers from glare when needed.

SOURCES

1 Compared to clear to dark photochromic lenses.

2 Mainster MA, Turner PL. Glare's causes, consequences, and clinical challenges after a century of ophthalmic study. Am J Ophthalmol. 2012 Apr;153(4):587-93. doi: 10.1016/j.ajo.2012.01.008. PMID: 22445628

3 Transitions Wearers Survey, Value Proposition & Light Management', US 2019, N=134 (self-declared very light sensitive to light) *caution: small sample size

4 Yam JC, Kwok AK. Ultraviolet light and ocular diseases. Int Ophthalmol. 2014 Apr;34(2):383-400. doi: 10.1007/s10792-013-9791-x. Epub 2013 May 31. PMID: 23722672.

5 Sheppard AL, Wolffsohn JS. Digital eye strain: prevalence, measurement and amelioration. BMJ Open Ophthalmol. 2018

6 Transitions Optical, Quality of Vision and Vision Experience Test In Real Life situations (Life Wearer Testing), U.S., Eurosyn, Q4 2019, N=146 (i.e. % of respondents who experienced at least one of the subset of light situations every day during the trial).

7 Transitions Optical, Global Consumer Sentiment and Behavior, Multi-country survey (AR, AU, CO, FR, IT, SG, ZA, UK, US), Q4 2020, People Research, N=6,403 - Base: Prescription Eyeglasses Wearers 18+ yo (N=4,586)

8 Coles-Brennan C., Sulley A. and Young G. (2019), Management of digital eye strain. Clin Exp Optom, 102: 18-29. https://doi.org/10.1111/cxo.12798

9 Transitions Optical, Usage & Attitude Survey, U.S., Q4 2020, Qualtrics, N=1,003 Eyeglass wearers

10 Source: Transitions Wearers Survey, Value Proposition & Light Management', US 2019, N=134 (self-declared very light sensitive to light) - 'Compared to wearers who declared they were not light sensitive'

11 Based on tests on polycarbonate grey lenses, up to 10% darker than the previous generation @ 23°C and up to 5% darker @ 35°C.

12 Based on tests across materials on grey lenses @ 23°C, using ISO 12312-1 standard.

13 Based on tests across materials on grey lenses @ 23°C. “Harmful blue light” is calculated between 380nm and 460nm.

14 The lens is not polarized behind the windshield. Based on tests across materials on grey lenses, achieving transmission below 45% @ 23°C behind a standard windshield. The lens achieves a polarization efficiency of 30% behind the windshield.

15 EcoOptics Limited - Prof. Nicholas Roberts, Quantitative study evaluating the visual benefits of the polarization properties of lenses, 2019/2020

16 Includes patent and patent applications which allowance, in force status varies over time and by country

17 Compared to clear to extra dark photochromic lenses. Transitions XTRActive Polarized polycarbonate grey lenses filter 35% of harmful blue light indoors. “Harmful blue light” is calculated between 380nm and 460nm.

18 EcoOptics Limited - Prof. Nicholas Roberts, Quantitative study evaluating the visual benefits of the polarization properties of lenses, Project 2 WP1 Dec 2020.

19 EcoOptics Limited - Prof. Nicholas Roberts, Quantitative study evaluating the visual benefits of the polarization properties of lenses, Project 2 WP2 Feb 2021.

20 Based on tests on polycarbonate grey lenses compared to Transitions Vantage. Fadeback claim based on fade back to 65% transmission @ 23°C.

Transitions™