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The effects of blue light on your eyes

Understanding blue light
and the need for protection
in the workplace

protecting people



Set your sights on blue light safety

The modern workplace has evolved. Whether you're in manufacturing, warehousing, logistics, or even working under lamps outdoors, artificial LED (light-emitting diodes) lights are replacing those old, dull lighting systems, saving companies millions of pounds in energy costs. But there is a new cost on the line: workers' eye health.

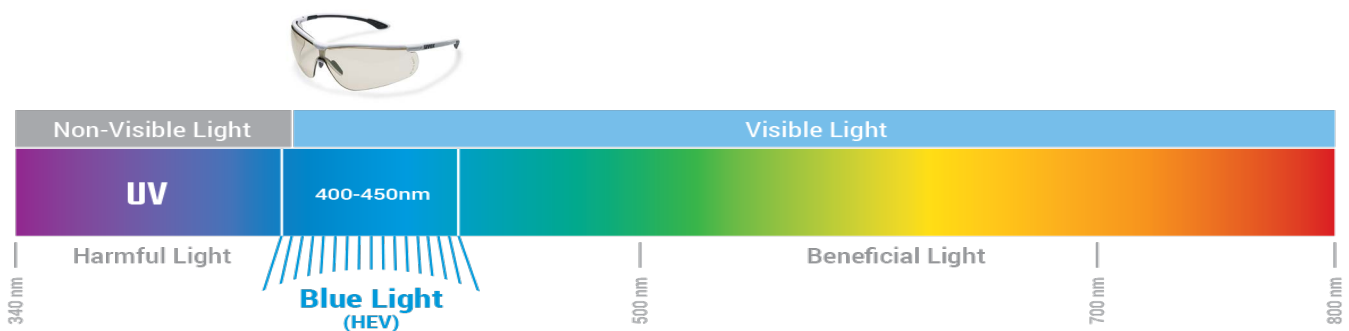
Headaches, neck pain, lower concentration and productivity, and even the potential for loss of vision could come from prolonged exposure to artificial light, as they expose employees' eyes to varying degrees of a very particular light ray, called blue light, while on the job.

Unfortunately, our eyes' natural filters do not provide sufficient protection against these kinds of light rays, and recent studies debate if there is a correlating rise in specific health issues with the increased use of LEDs. By understanding what blue light is and where it can be found in your workplace, as well as considering options to mitigate or eliminate exposure, you'll not only help keep potential accidents to a minimum, but you'll help ensure the safety and health of your employees' eyes.

What is blue light?

The origins of blue light start with the sun. Sunlight consists of both visible light rays and invisible ultraviolet rays that contain different amounts of energy. Light is made up of electromagnetic particles that travel in waves, creating energy levels based on the varying length and strength of those waves. For example, shorter wavelengths mean higher energy emissions.

Wavelengths are measured in nanometers and grouped into gamma rays, x-rays, ultraviolet (UV) rays, visible light, infrared light, and radio waves. Together, these wavelengths make up the electromagnetic spectrum (see chart for reference).



Nestled in-between ultraviolet and infrared, visible light is the only part of the electromagnetic spectrum the human eye is sensitive enough to see and is recognised by the human eye as violet, indigo, blue, green, yellow, orange, and red.

Approximately one-third of all visible light is considered high-energy visible (HEV) or blue light, as it has one of the shortest and highest-energy wavelengths. Blue light passes through and reaches the retina, whereas UV is largely absorbed by the front of the eye.

Where is blue light in the workplace?

The primary source of blue light comes from the sun, but many man-made sources cause exposure – and they are on the rise.

Fluorescent and LED lighting: Both highly used lighting systems in work environments, most unfiltered fluorescent light and all LED light emit levels of blue light that can be glaring and limit visibility, causing the eyes to constrict. Over time, the tensing of muscles in the eyes and face can lead to headaches.



LEDs are a popular, cost-effective option, as they are about five times more efficient than fluorescent lighting, and the bulbs are more durable and need replacing less frequently. Due to the widespread use, employees are gradually being exposed to more and more sources of blue light and for longer periods.

Digital Screens: At work, 43% of adults use a computer, tablet, or smartphone for prolonged periods. The advancement of digital screen technology within the last decade has used LED back-light technology to enhance screen brightness and clarity in mobile phones, computers, tablets, flat-screen televisions, and more. These LEDs emit very strong blue light waves.

The good and bad of blue light

Our bodies harness the energy of blue light in several ways to improve overall health, though too much exposure could cause issues. And in the workplace, that could lead to accidents.

The Good:

- In its natural form, one of the most significant benefits of blue light is its ability to regulate our sleeping and waking cycles, known as our circadian rhythm. Research has shown that HEV light boosts alertness and reaction times, improves memory and cognitive function, and elevates mood, which is especially helpful during the day and at work.
- Blue light is used as therapy to treat Seasonal Affective Disorder (SAD), a type of depression that's related to changes in seasons (you or your employees may have experienced this during autumn or winter). The light sources for this therapy emit bright white light that contains a significant amount of HEV blue light rays, which help to activate the "daytime" circadian rhythm.

The Bad:

- Chronic exposure to blue light – especially at night – can disrupt your circadian rhythm, potentially causing sleepless nights and daytime fatigue. Exposure to light suppresses the secretion of melatonin (the hormone that regulates sleep), and lower melatonin levels might explain the association with these types of health problems.
- Harvard researchers have linked working the night shift and exposure to blue light at night to several types of cancer, diabetes, heart disease, obesity and an increased risk for depression.
- A study found a 60 percent higher incidence rate of breast cancer in nurses and attributed it to the blue component in light used in facilities during the night shift.

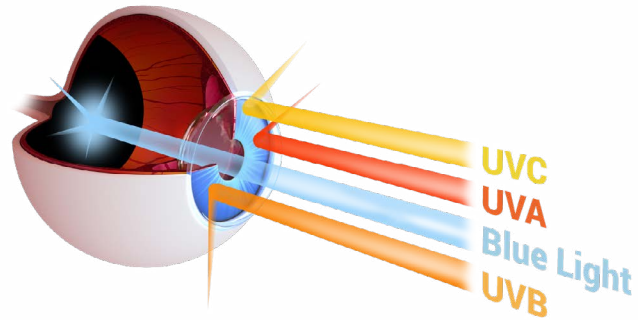
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Let's take a more in-depth look at how blue light affects the eye, as this is where most companies can help mitigate or eliminate issues. The adult human eye (the cornea and lens) are very effective at blocking UV rays from reaching the light-sensitive retina at the back of the eyeball. However, virtually all visible blue light passes through the cornea and lens to reach the retina (the inner lining of the back of the eye), which is where damage can occur. Early research shows that too much exposure to blue light could lead to:

Retina Damage: A Harvard medical study states that [HEV] blue light has been identified for years as the most dangerous light for the retina, where chronic exposure could impact the long-range growth of:

- Macular degeneration
- Glaucoma
- Retinal degenerative diseases

Additionally, blue rays, more than any other rays of the spectrum, seem to accelerate age-related macular degeneration (AMD). According to the macularsociety.org, nearly 1.5 million people in the UK are affected by macular degeneration.



Digital Eye Strain: Blue light waves are not as easily focused due to their high energy levels, meaning they scatter. This can reduce contrast when performing focused work in particularly bright areas or especially on digital screens, and the resultant “noise” can contribute to digital eye strain. Symptoms can include blurry vision, difficulty focusing, dry and irritated eyes, headaches or neck and back pain, all of which can affect learning and productivity.

For those working on digital screens, digital eye strain is a medical issue and has overtaken carpal-tunnel syndrome as the number one computer-related complaint.

Blue light safety is key

Wearing safety glasses that reduce harmful blue light is recommended primarily for workplaces with prolonged access to artificial overhead lighting, as well as those with excessive digital screen use. This is doubly important for those working the night shift, or outside.

The best safety eyewear to help with blue light reduction and increased productivity is to find some with 65% lens tint, as according to research in the field, this is the optimal tint for the eye in artificial indoor light. This transmission is just dark enough to relieve the tensing of muscles in the eyes and face, yet still have the clarity and contrast of vision that eyes need to work comfortably throughout the day.

Other UV Rays Include:

- UVC (Deep Ultraviolet): Found in man-made sources, like mercury lamps and welding torches
- UVA (Longwave Ultraviolet, 320-400): Accounts for 95% of the UV radiation that reaches the earth's surface, used in tanning beds, penetrates clouds and windows, causes premature aging of skin
- UVB (Shortwave Ultraviolet, 290-320): Causes most sunburns, linked to skin cancer, damages DNA in skin, burns unprotected skin in 15 min
- Blue light (Visible light spectrum, 380-500)

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It is important to note that some safety policies do not recognise tints for indoor use, however, some blue light blocking lenses do not have a mirrored front and can therefore, allow employees eyes to be seen easily. Not all safety glasses with a blue lens offer the same level of protection and should be checked carefully concerning the protective claims being made.

If you do not have access to blue light safety eyewear, here are some tips that you can implement right now to help mitigate the effects of blue light:

- Build awareness with your employees on the effects of blue light
- Take a quick break if you're starting to feel eye strain, fatigue, or headaches
- Shift work to different applications to help prevent extended exposure to areas of high blue light exposure
- Use a blue light filtering screen or turn off the blue light settings on digital device
- Limit use of LED screen devices to 1 hour at a time
- Build blinking exercises into your daily routine to work eye muscles and refocus eyesight

The uvex solution

uvex safety is working to create the most advanced line of safety eyewear in the industry. Our innovative safety eyewear is focused on 'wearability' and was developed as a natural extension of our core mission: protecting people.

The CBR65 lens by uvex is a revolution in eyewear protection, giving workers more Contrast enhancement, Blue light reduction, and Relaxed vision with 65% transmission – thus the CBR65 name.



On the left: visual without CBR65. On the right: visual with CBR65.

CBR65 absorbs up to 50% of blue light with maximum absorption of 450nm providing protection against harmful blue light, while at the same time offering better contrast for a clearer vision to help reduce strain on the eyes and increase comfort. The 65% visible light transmission delivers a relaxed field-of-vision and prevents the eye from getting tired too fast. Even in particularly bright workplaces, this enables the wearer to remain focused for a longer length of time without the strain.

CBR65 is ideal for:

- Working indoors under harsh light conditions (strong neon, LED lighting, or very bright environments)
- People working in changing light environments, either indoors or outdoors
- Workers that require high levels of concentration or undertake close inspection work





About uvex

The uvex group brings together three globally active companies under one roof: the uvex safety group, the uvex sports group (with uvex sports and Alpina Sports), and the Filtral group (Filtral and Primetta). The uvex group is represented in 22 countries by 48 subsidiaries but chooses to do most of its manufacturing in Germany.

Two thirds of the company's 2,600-strong workforce (as at fiscal year 2016/2017) is employed in Germany. uvex is a global partner to international elite sport and equips a host of top athletes. The motto protecting people is at the heart of the company's activities. uvex develops, manufactures and distributes products and services for the safety and protection of people at work, in sport and for leisure pursuits.

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