Eyewear Lens Type Selection – Quick Tips

According to the Bureau of Labor Statistics, nearly three out of every five workers who suffered eye injuries were not wearing eye protection at the time of the accident. Wearing the correct safety eyewear for the task and for the unique needs of the worker is important. Choosing protective eyewear is not as simple as just selecting a pair of safety glasses that meet the American National Standards Institute / International Safety Equipment Association (ANSI/ISEA) American National Standard for Occupational and Educational Personal Eye and Face Protection Devices Z87.1-2015. There are many features available for eyewear that can help ensure you have the best eyewear for the job you do. These features include lens coatings, lens tints/colors, welding filter shades and sizing.

Lens Coatings

Lens coatings can enhance the versatility (and even the life span) of a pair of safety glasses. These coatings are often available separately or in combination with other coatings for more functionality. One available type is an anti-scratch coating. This coating is designed to protect the lens when subjected to repeated impacts such as in grinding applications and other abrasive applications. It can also help extend the life of glasses when they are stored in conditions that may precipitate scratches. Some of these coatings are added on top of the standard lens while others are permanently bonded to the lens for even longer life.

Anti-fog coated lenses are another option to get the best performance out of safety glasses. Fogging is reported as the leading challenge workers face with safety eyewear. This type of lens coating helps reduce fogging in conditions such as cold-to-warm temperature transitions, humid environments or when eye protection is worn with half-mask respirators. While an anti-fog coating is not 100% fog proof, fogging can be minimized by getting a pair of eyewear with a fog-free lens that sits further away from the face and supplementing the lens coating by adding an anti-fog cleaner or spray.

Anti-static coatings are another option. These coatings help reduce the dust and particulate levels that stick to eyewear. They work well in environments where particulate levels are a concern or where dusts and particulates sticking to the lens would create a safety concern due to reduced visibility.

Mirror coatings come in a variety of colors and are used to help reduce glare. Slight mirror coatings on clear lenses are appropriate for indoor/outdoor glare reduction and for workers going from light to dark conditions. Mirrored coatings on tinted lenses are for outdoor work in bright conditions where glare is a concern.

Lens Tints/Color Options

Polycarbonate lenses set the standard for today's safety eyewear and are available in many colors and tints. Selecting the correct colored lens for the application is important to help get the best visual acuity.

Two terms are commonly used to aid in the selection of the correct lens color and tint. The first is visible light transmittance (VLT). This is expressed as a percentage of available light that will pass through the lens. The second is the ultraviolet (UV) or infrared (IR) absorption. This is expressed as the percentage of UVA and UVB or IR radiation the lens will absorb up to a maximum wavelength in nanometers (nm). Both the VLT and UV/IR absorptions can vary by manufacturer, so always check the eyewear specifications to ensure you have what you need.

Clear lenses are appropriate for general indoor applications or outdoor applications with low light conditions.

Gray lenses are typically referred to as a sunglass-style tint. They are used in environments where bright light conditions and glare could cause eye fatigue. A gray lens provides good color recognition but should not be used in low light conditions as it can block too much light.

Brown/bronze/espresso lenses are similar to gray lenses and can be used like a sunglass lens where bright light conditions or glare can cause eye fatigue. This lens should not be used in low light conditions. These lenses generally meet color traffic signal recognition (TSR) requirements. TSR lenses are tinted lenses that minimize the alteration of real world colors when viewed through the lens. These lenses are good for occupations such as motor vehicle operators and painters. The requirements for TSR lenses are located in ANSI Z80.3-2015, Non-Prescription Sunglasses and Fashion Eyewear Requirements.

Indoor/outdoor lenses are used for employees who go from light to dark conditions or need to reduce glare in indoor conditions due to harsh lighting. An indoor/outdoor lens is a clear lens with a slightly mirrored surface to reduce glare. This lens is not a photochromic (auto-darkening) lens.

Amber/yellow lenses are appropriate for low light conditions. This lens color blocks blue light and gives optimum contrast. This lens should not be used at night as too much light is blocked.

Light blue lenses reduce glare and the yellow tint often given off by industrial/sodium vapor lighting. Yellow light can cause eyestrain and fatigue.

Vermillion/red lenses enhance contrast while color perception is unaffected. They are often used in inspection applications where color acuity is needed.

Photochromic lenses transition from light to dark with changing light conditions. That means changing outdoor light conditions don't require changing eyewear.

Dark green lenses offer general-purpose protection from glare and UV. This tint should not be confused with a welding filter shade and will not provide adequate protection during soldering, torch blazing, cutting, gas welding or electric arc welding.

Welding Filter Shades

These filter shade lenses are designed specifically to be worn during soldering, torch blazing, cutting, gas welding and electric arc welding operations. They should

never be worn as a general-purpose sunglass or for driving due to reduced light transmittance and the color distortion associated with filter shades. Shaded lensed safety spectacles generally come in shade 3.0 or shade 5.0.

The Occupational Safety and Health Administration (OSHA) standard on eye and face protection, 29 CFR 1910.133(a)(5), references the filter lenses that are appropriate based on the operation being performed. See Grainger's Quick Tips #109 for more information on selecting the appropriate welding shade. The ANSI/ISEA Z87.1-2015 Eye and Face Protection Selection Tool provides the most complete and up-to-date selection criteria for welding applications.

Lens Sizing

Most eyewear is made in a standard size to fit most faces. But in situations where a one-size-fits-all approach doesn't work, other sizes are often available to make wearing safety glasses comfortable. ANSI/ISEA Z87.1-2015 uses a European small and medium head form size for testing. And some styles are available with adjustable temples for a more customized fit.

OTG or over-the-glass eyewear is made to facilitate wearing safety glasses over prescription glasses. These glasses have a wider frame and lens to allow for most prescription eyewear to be worn underneath.

Wide safety glasses are made for people with wider facial features, while narrow styles are available for women and individuals with smaller or narrower faces.

Commonly Asked Questions

1. **I need protection from UV light. What eyewear will provide protection?**

A: UV is the spectrum of light we're most concerned about causing damage when we're outdoors and spans from 10-400 nm. All clear polycarbonate eyewear provides 99.9% UV protection up to approximately 380 nm. For specific UV product applications and wavelengths, check the specifications to see if the eyewear selected will cover your needs. Or contact your safety eyewear supplier for guidance.

1. **I used a fog-free product on my lenses and they still fog up when I leave my freezer. Is that normal?**

A: Fog-free cleaners and wipes are made to help minimize fogging. But in some extreme conditions, fogging will still happen due to the physics of the moisture molecules from the wearer being attracted to the nearest surface. No anti-fog coating is ever 100% fog free in all conditions.

1. **I've used welding shades in the past and they are green to dark green. Can I use dark green colored safety glasses in place of a shaded lens?**

A: No. Welding filter shades are designed to protect from optical/radiant energy which includes specific requirements for UV ranges and infrared protection. A green tinted lens will not provide the needed protection for welding. See 29 CFR 1910.133(a)(5) for guidance.

1. **What do polarized lenses do?**

A: According to Honeywell-Uvex, polarized lenses reflect polarized light that causes glare. This eliminates eye strain, eye fatigue, discomfort and poor visual acuity. They allow the wearer to see fine detail and deep colors without straining his or her vision.

Sources

OSHA Eye and Face Protection Standard, 29 CFR 1910.133

ANSI/ISEA Z87.1-2015 American National Standard for Occupational and Educational Personal Eye and Face Protection Devices

Uvex Lens Technology Resources

Quick Tips #109