

Sunglasses Safety Fact Sheet

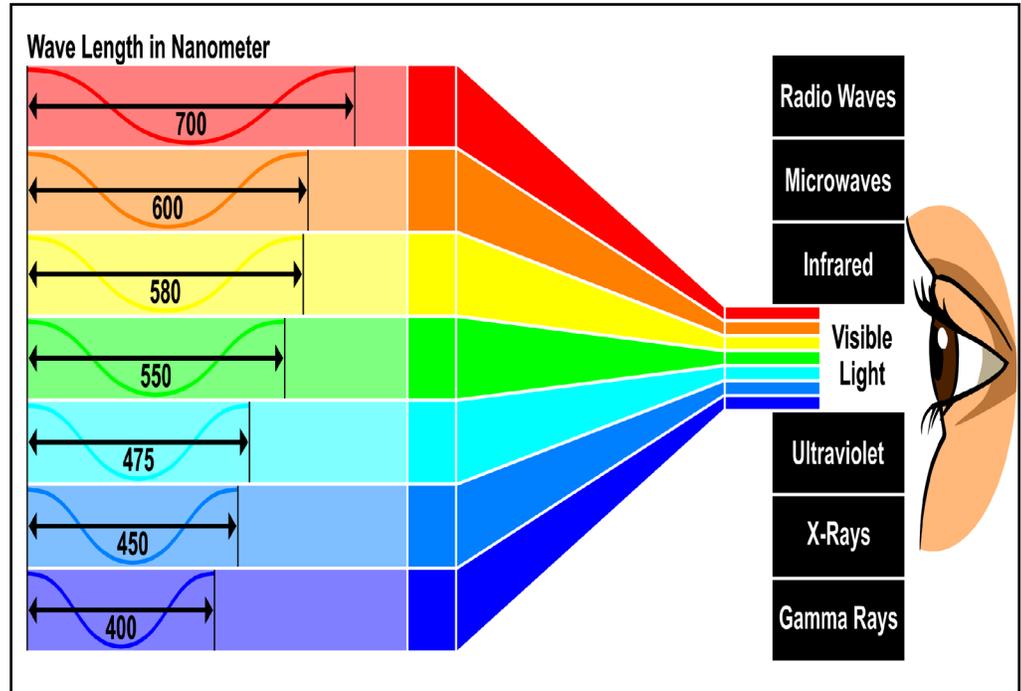
HS05-045C (01-22)

Sunglasses are more than fashion accessories. They are a necessary protection against the sun's rays that can damage the eyes.

Ultraviolet (UV) and Infrared (IR) Light

UV and IR light are types of [electromagnetic radiation](#) that are transmitted from the sun in waves or particles.¹ If light is viewed on a spectrum, UV light is at the short end, visible light is in the center, and IR wavelengths are at the long end.² IR light is invisible to the human eye but can be felt as heat.³ UV light is the same radiation that makes black-light posters glow and gives people summer tans – and sunburns. It can also be responsible for damaging living tissue such as the eyes.

UV-A rays can hurt the central vision in the eyes and damage the [macula](#), a part of the retina at the back of the eye. The front part of the eye – the [cornea and the lens](#) – absorb most **UV-B rays**, but these rays often cause more damage to the eyes than UV-A rays.⁴ Over time these invisible UV rays can harm the eye if left unprotected. **Workers who are heavily exposed to sunlight should protect their eyes with sunglasses. However, wearing sunglasses without UV protection can cause more damage than not wearing glasses at all.**⁵



Sunglasses and Eye Health

Sunglasses with UV protection help in two important ways. They filter light and protect the eyes from damaging rays that can lead to [cataracts](#), [macular degeneration](#), skin cancer around the eyelids, and other eye diseases.⁶

Here are some important facts about electromagnetic radiation and eye health:

- UV levels are three times greater in summer than winter.
- Sunlight reflected off of water, snow, and pavement intensifies UV light and makes it more dangerous.
- 20% of cataract cases are due to UV rays.
- 3.2 million people go blind every year due to prolonged UV exposure.⁷

Choosing the Right Sunglasses



It is important to wear proper eye protection to block the UV rays. Sunglasses should:

- block out 99% to 100% of both UV-A and UV-B radiation;
- screen out 75% to 90% of visible light;
- have lenses that are free from distortion and imperfection; and
- have lenses that match in color for proper color recognition.⁸

Protecting Eyes from the Sun

In addition to choosing the right sunglasses, these tips provide extra eye protection:

- Wear a wide-brimmed hat or cap. This keeps the sunlight directly overhead from slipping past sunglasses.
- Never look directly at the sun even with sunglasses because it can cause permanent eye damage.
- Take extra precautions with the sun if taking medications such as [tetracycline](#) or [allopurinol](#) that increase light and eye sensitivity.
- People with an eye disease such as macular degeneration should reduce time in the sun since they are at increased risk of UV-related eye damage.

Choosing a Lens Color Wisely

Sunglass lenses are treated with UV-absorbing chemicals. These chemicals are usually colorless, so clear lenses can block light just as well as dark ones.⁹ So why are so many lens colors available? One benefit of tinted lenses is that they block glare. An added benefit is that different lens colors filter different wavelengths of light and are best used for different purposes.¹⁰ The purpose of tinted lenses and the benefits of different colors are:

- **Green**—Allows true color perception and good contrast in bright light; reduces eyestrain in bright light; filters some blue light; reduces glare; is best for precision sports such as golf.
- **Gray**—Allows true color perception but does not enhance contrast; reduces brightness and glare; is best for driving and outdoor sports.
- **Amber/Brown**—Brightens cloudy, hazy, or foggy skies; excellent for contrast; good for high-glare environments; minimizes eyestrain; distorts color making images look yellow-orange; is best for sports such as fishing, hunting, and cycling.
- **Yellow/Orange**—Improves contrast and depth perception in low light; good for overcast days; is best for snow activities and indoor sports.
- **Rose/Red**—Excellent depth perception in low light; helps to contrast objects against blue or green backgrounds; helps with visibility while driving; blocks blue light to help reduce glare and eyestrain from computer use.
- **Mirrored**—Reflects high-intensity light to reduce glare and is available in various colors.

Choosing the Right Safety Sunglasses

While **conventional sunglasses** may protect the eyes from glare, they **do a poor job of protecting the eyes from industrial hazards such as chemical splashes, flying objects, and dust.** In fact, conventional sunglasses present their own hazards in the workplace.

The lenses and frames on safety sunglasses are stronger than those on conventional sunglasses. When an object strikes a safety sunglass lens it is unlikely the lens will dislodge. This is not true of conventional eyewear, especially those with wireframes. When an object strikes the lens of conventional sunglasses, the lens can shatter, showering the wearer's eye with shards of glass or plastic. If a lens breaks on a pair of approved safety sunglasses, it is designed to not shatter back into the eye. Safety sunglasses also have shields to reduce the risk of foreign objects reaching the eye from the sides, top, or bottom.

Sunglasses do not protect eyes when welding, brazing, cutting, or using lasers.

Because sunglasses have darkened lenses, some people mistakenly believe they provide the needed protection against [radiant energy](#) welding processes. However, wearing glasses with darkened lenses that are not made for industrial applications can be more dangerous than wearing no glasses at all. This is because the eye attempts to compensate for less light by opening the pupil wider. In turn, this allows more damaging radiation into the eye.

For adequate protection from the light produced by using lasers, welding, or other jobs that require exposure to radiant energy, [OSHA recommends filtered lens for specific tasks:](#)



Table 1-Filter Lens Shade Numbers for Protection Against Radiant Energy

Welding Operation	Shade Number
Shielded metal-arc welding 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	10
Gas-shielded arc welding (nonferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	11
Gas-shielded arc welding (ferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	12
Shielded metal-arc welding 3/16-, 7/32-, 1/4-inch diameter electrodes	12
5/16-, 3/8-inch diameter electrodes	14
Atomic hydrogen welding	10-14
Carbon-arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 inch to 6 inches	4 or 5
Heavy cutting, over 6 inches	5 or 6

Gas welding (light), up to 1/8-inch	4 or 5
Gas welding (medium), 1/8-inch to 1/2-inch	5 or 6
Gas welding (heavy), over 1/2-inch	6 or 8

Intensity, CW maximum power density (watts/cm ²)	Attenuation	
	Optical density (O.D.)	Attenuation factor
10 ⁻²	5	10 ⁵
10 ⁻¹	6	10 ⁶
1.0	7	10 ⁷
10.0	8	10 ⁸

In addition to the proper filter lens shade, use these tips when purchasing safety sunglasses:

- Check for an American National Standards Institute (ANSI) 787.1 rating.
- Choose lightweight, adjustable glasses. They cannot protect an employee's eyes if they will not wear them.
- Check for a 99% or 100% UV protection label.
- Choose glasses that fit close to the face so UV rays will not filter inside the lenses.
- Select styles with large or wrap-around lenses to prevent light or other harmful substances from entering the eye.
- Do not be misguided by price. Higher-priced safety sunglasses may reflect fashion, not UV protection.

- Know that dark-colored sunglasses do not necessarily provide better protection because the chemical coating applied to the lens for UV protection is clear.

Eye Protection for Employees Who Wear Prescription Glasses

For employees who wear prescription eyeglasses while exposed to eye hazards, [OSHA requires employers to provide them with safety eye protection that does not affect their vision](#). Under most circumstances, the employer can provide at no cost to employees safety goggles that fit over their prescription lenses. However, employers who require prescription safety glasses but bar employees from removing them from the workplace, are obligated to pay for the prescription protective eyewear.¹¹ Also, an employer must pay for prescription eyewear inserts and lenses for full-face respirators.¹² As with non-prescription safety sunglasses, look for eyewear that carries the ANSI labeling and a Z87 or Z87+ mark to indicate that the lenses, frames, and side shields meet impact or high-impact standards.

Worker safety means more than good employee relations. Maintaining a safe work environment prevents productivity losses, keeps insurance premiums down, and avoids worker's compensation costs. Remember to practice safety. Wear eye protection wherever needed on the job and whenever going outside, no matter how briefly.

For more information on eye safety, review [OSHA's standards on eye protection](#) or download or stream any of DWC's free [eye wellness safety publications](#) or [workplace safety videos](#).

References

- ¹ Lucus, Jim. "What is Ultraviolet Light?" Live Science, Sept. 15, 2017. Website. <https://www.livescience.com/50326-what-is-ultraviolet-light.html>. Accessed January 13, 2022.
- ² American Museum of Natural History, "Light, Ultraviolet, and Infrared." Website. <https://www.amnh.org/research/natural-science-collections-conservation/general-conservation/preventive-conservation/light-ultraviolet-and-infrared>. Accessed January 13, 2022.
- ³ Lucus, Jim. "Infrared?" Live Science, Feb. 27, 2019. Website. <https://www.livescience.com/50260-infrared-radiation.html>. Accessed January 13, 2022.
- ⁴ John Hopkins Medicine, "How to Protect Your Eyes from UV Damage." Website. <https://www.hopkinsmedicine.org/news/articles/how-to-protect-your-eyes-from-uv-damage>. Accessed January 13, 2022.
- ⁵ Columbia University Irving Medical Center, "Sunglasses and Your Eyes," May 31, 2023. Website. <https://www.columbiadoctors.org/news/sunglasses-and-your-eyes#:~:text=Can%20wearing%20sunglasses%20damage%20your,UV%20to%20access%20the%20eye>. Accessed January 24, 2024.
- ⁶ John Hopkins Medicine, "How to Protect Your Eyes from UV Damage." Website. <https://www.hopkinsmedicine.org/news/articles/how-to-protect-your-eyes-from-uv-damage>. Accessed January 13, 2022.
- ⁷ John Hopkins Medicine, "How to Protect Your Eyes from UV Damage." Website. <https://www.hopkinsmedicine.org/news/articles/how-to-protect-your-eyes-from-uv-damage>. Accessed January 13, 2022.
- ⁸ John Hopkins Medicine, "How to Protect Your Eyes from UV Damage." Website. <https://www.hopkinsmedicine.org/news/articles/how-to-protect-your-eyes-from-uv-damage>. Accessed January 13, 2022.
- ⁹ Giannos SA, Kraft ER, Lyons LJ, Gupta PK. "Spectral Evaluation of Eyeglass Blocking Efficiency of Ultraviolet/High-Energy Visible Blue Light for Ocular Protection," Optometry and Vision Science, July 2019, Vol. 96:7, p513-522. Website. https://journals.lww.com/optvissci/Fulltext/2019/07000/Spectral_Evaluation_of_Eyeglass_Blocking.8.aspx. Accessed January 13, 2022.
- ¹⁰ Very Well Health, "Choosing the Right Tint for Your Sunglasses." Website. <https://www.verywellhealth.com/sunglasses-does-color-matter-3421920>. Accessed January 13, 2022.
- ¹¹ Occupational Safety and Health Administration, "Employer Liability and Payment Requirements for Prescription Protective Eyewear." Website. <https://www.osha.gov/laws-regs/standardinterpretations/2007-05-14>. Accessed January 17, 2022.
- ¹² Occupational Safety and Health Administration Standard 1910.133 Eye and Face Protection. Website. <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.133>. Accessed January 17, 2022.



www.txsafetyatwork.com

1-800-252-7031, Option 2

*The Texas Department of Insurance,
Division of Workers' Compensation (DWC)-Workplace Safety
P.O. Box 12050
Austin, TX 78711-2050*

Disclaimer: Unless otherwise noted, this document was produced by the Texas Department of Insurance, Division of Workers' Compensation using information from staff subject specialists, government entities, or other authoritative sources. Information contained in this fact sheet is considered accurate at the time of publication. For more free publications and other occupational safety and health resources, visit www.txsafetyatwork.com, call 800-252-7031, option 2, or email resourcecenter@tdi.texas.gov.