

Impact Protection and Polycarbonate Lenses

Prevent Blindness believes that all eyewear should protect eyes from impact hazards. Recognizing that the use of polycarbonate materials can help to greatly reduce the frequency and severity of impact injuries to eyes, Prevent Blindness recommends:

When safety is a major issue, lenses in plano and prescription glasses, sunglasses, fashion and occupational eyewear, and the lenses and frames for sports eyewear should be made from polycarbonate materials to provide additional protection for wearers.

The Need for Safety

Today's active lifestyles have placed more Americans at risk of injury, particularly eye injury. Work, sports, recreational activities and hobbies—even routine tasks—expose eyes to a variety of hazards. The lenses in all glasses (prescription, sunglasses and fashion eyewear) must meet FDA minimal impact standards established in 1971. While they do provide some protection for the wearer, they do not provide adequate protection for many common impact hazards. These include hazards at work, as well as during sports or recreational activities. Hazardous situations require the use of eyewear, both lenses and frames, that meet higher level safety standards. Currently, lenses made from polycarbonate materials provide the highest level of impact protection.

Facts About Eye Injuries

- Nearly one million Americans have lost some degree of sight (a chronic or permanent disability) due to an eye injury. About 7% have a severe impairment and about 9% are blind in one eye. Eye injuries account for 40,000 to 50,000 new cases of impaired vision each year. In 90% of these cases, the injury could have been prevented, or at least could have been less severe, if the victim had been wearing protective eyewear.¹
- The U.S. Occupational Safety and Health Act (OSHA) of 1970 (Public Law 91-596) requires that “workers’ vision be protected.” The standard that applies to protective eyewear used in the industrial environment is titled The American National Standard Practice for Occupational and Educational Eye and Face Protection (ANSI Z-87.1).² Protective eyewear designed to conform to ANSI Z-87 must meet strict safety and performance criteria. Yet despite this requirement, as many as 2,000 eye injuries occur each day in the workplace.³

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(continued)

- Information from a 1988 study conducted by the National Institutes for Occupational Safety and Health (NIOSH) indicates that between 600,000-700,000 occupational eye injuries occur per year, with 16% in the construction industry.⁴
- According to the Optical Manufacturers Association, an estimated 60% of Americans wear prescription lenses. Since 1970, the U.S. Food and Drug Administration has required that lenses in prescription glasses, sunglasses and fashion eyewear meet minimal impact standards. Prior to 1970, there were an estimated 120,000 lens-related injuries each year.⁵
- According to 2002 statistics, there were an estimated 262,000 product-related eye injuries treated in U.S. hospital emergency rooms. The categories contributing to the highest injuries were related to household (124,998), workplace (96,938) and sports (35,633).⁶
- Several types of materials are currently used to make lenses. The most common are treated glass, alloy resin plastic (CR-39, registered trademark of PPG Industries) and polycarbonate. Each of these materials can be used in a manner to satisfy the various regulations (i.e., FDA and OSHA) and standards (i.e., ASTM and ANSI).⁷

Recommendations

- Plano and prescription polycarbonate lenses offer the best impact protection and should be used whenever possible.
- Certain lens coatings may reduce the impact effectiveness of polycarbonate and some lens tints may be difficult or impossible to apply. In these and other such situations, alternative lens materials should be used.
- For everyday prescription eyewear, polycarbonate lenses should meet or exceed the requirements of American National Standards Institute (ANSI), Recommendations for Prescription Ophthalmic Lenses (ANSI Z-80.1, latest edition).
- For sunglasses and fashion eyewear, polycarbonate lenses should meet or exceed the requirements of ANSI, Requirements for Non-prescription Sunglasses and Fashion Eyewear (ANSI Z-80.3, latest edition).
- For occupational use, polycarbonate lenses and frames must meet or exceed the requirements of ANSI, American National Standard Practice for Occupational and Educational Eye and Face Protection (ANSI Z-87.1, latest edition).
- For sports use, polycarbonate lenses must be used with protectors that meet or exceed the requirements of ASTM International, Standard Specification for Eye Protectors for Use by Players of Racquet Sports (ASTM F803, latest edition); Standard Specification for Eye Protective Devices—Alpine Skiing (ASTM F659, latest edition); Standard Safety Specification for Eye and Face Protective Equipment for Hockey Players (ASTM F513, latest edition); Standard Specification for Face Guards for Youth Baseball (ASTM F910, latest edition); or other applicable standard specifications for eye and face protection in sports.

References

1. National Society to Prevent Blindness, *Vision Problems in the U.S.*, New York, NY, 1980.
2. Occupational Safety and Health Administration (OSHA), *Occupational Safety and Health Act (Public Law 91-596)* Washington, DC, 1970.
3. Prevent Blindness, *Guide to Controlling Eye Injuries in Industry*, Schaumburg, IL, 1991.
4. National Institutes for Occupational Safety and Health (NIOSH), *National Health Interview Survey Occupation Health Supplement*, Washington, DC, 1988.
5. Waller, Julian A. M.D., M.P.H., *Injury Control—A Guide to the Causes and Prevention of Trauma*, Lexington Books, Lexington, MA, 1985.
6. U.S. Consumer Product Safety Commission, Directorate for Epidemiology; National Injury Information Clearinghouse; National Electronic Injury Surveillance System (NEISS), *Product Summary Report—Eye Injuries Only, 2002*, Washington, DC, 2003.
7. Davis, John K., *Perspectives on Impact Resistance and Polycarbonate Lenses*, International Ophthalmology Clinics, Vol. 28, No. 3, Little, Brown and Company, Boston, MA, 1988.