



What is eye safety?

The human eye, by design, is naturally protected from foreign objects. The shape of the head provides a shielded position for the eyes. The lids are protective curtains, which close automatically to shut out flying objects and glaring lights.

However, this protection may not be enough — as anyone knows who has caught a cinder or an insect in the eye before the lid has closed.

What about eye protection on the job?

Workers may be exposed to flying particles of dust, metal, wood, glass, concrete or other hard substances; hot oil; fire; steam; sparks; acids; or other chemicals. To help prevent eye injuries, protective eye shields, glasses or other accepted eye protection are needed and required.

Optical companies offer many types of safety glasses and goggles. This document describes several of the more common types. Employers should seek the advice of a qualified eye-protection manufacturing representative, who can survey the working conditions and plant hazards, and suggest the appropriate type of eye protection.

As a general guideline, please refer to the recommended eye and face protective devices as published by the American National Standards Institute Inc. (ANSI) Z87.1-1989.

Every employer should have a copy of this standard. You can order it from the ANSI, 11 W. 42nd St., New York, NY 10036.

This section describes commonly used goggles, face shields and safety glasses. All employers who purchase this equipment must specify ANSI quality lenses in ANSI-approved slow-burning quality frames. Ohio law also requires these frames.

Cup goggle — designed for operations where there is danger of foreign particles striking the eyes from the sides, top or bottom, such as chipping, grinding, babbitting, riveting, performing hand-tool and

machine operations, rail cutting, spike driving, rivet cutting and others.

Dust goggle — recommended for use in cement plants and compressed air operations where fine dust particles and powder create severe eye hazards. Dust goggles also protect against the impact of flying particles from any direction.

Cover goggle — designed for use over prescription glasses, providing maximum protection against all types of foreign particles coming from any direction, when chipping, grinding, babbitting, riveting, performing hand-tool and machine operations, rail cutting, spike driving and rivet cutting.

Flexible mask impact goggle — guards the eyes from flying particles of all types that strike from any direction, providing protection during operations, such as babbitting, chipping, cutting rivets, light grinding, on-hand or machine tool work, or any task where spark or explosion hazards are present.

Goggle for acetylene welding — a special type of goggle designed for acetylene welding, cutting, burning, brazing and furnace operations, providing protection against injurious light rays, glare, flying sparks and scale.

Flexible mask chemical goggle — specifically designed to offer protection against corrosive liquid splashes encountered in chemical process industries, but not impact from flying particles.

Face shield — designed to protect the eyes and face from the hazards of sawing, chemical work, buffing, sanding, light grinding, incandescent lamps, electronic tubes, glass bottle manufacturing, bottling and similar operations. Many types of shields are available. These shields do not fully comply with ANSI Z87.11989 requirements; therefore, you must also wear approved safety glasses.

Welding helmets — designed to protect the eyes during welding operations from injurious light rays. You must wear safety glasses under welding helmets.

Safety glasses — look and feel like an ordinary pair of spectacles, but the lenses are made of industrial specification safety glass or plastic, offering increased frontal protection from flying particles. Plastic lenses offer greater impact resistance than glass lenses and are lightweight. However, they are less resistant to scratching than glass. Sideshields often are needed and are suggested for additional protection.

Fit safety glasses or goggles properly

Just as some people are long and thin, so are some faces. Other faces are large and round. Obviously, everyone can't wear the same size glasses or goggles.

You must fit safety eyewear properly. It should be the responsibility of the person in charge of dispensing safety glasses or goggles to see that each individual receives properly fitted and adjusted eyewear.

If you require corrective lenses, wear prescription safety glasses. Leading optical companies offer corrective prescription services.

Plant visitors must wear the protective devices that are required for workers on the job. Have a supply of safety glasses or goggles available to loan to visitors.

Sterilize all eye protective equipment, whether issued to employees or to visitors. Sterilize before each use to remove any harmful or toxic substance.

Photogray or photochromic glasse

ANSI now allows these lenses for indoor use, but recommends you use them with care in operations requiring precise visual acuity or fast reaction to visual stimuli. For example, exercise caution in operations where the wearer passes from indoors to outdoors such as a forklift operator driving in and out of a building.

Although photochromic lenses absorb ultraviolet light, do not use them in hazardous-radiation environments. The Occupational Safety and Health Administration's (OSHA's) rules differ from the ANSI standard. OSHA prohibits the use of photochromic lenses for workers who pass back and forth from indoors to outdoors. For more information, consult ANSI Z87.1-1989 and OSHA 1919.133(a)(3).

Impact-resistant lenses

Streetwear eyeglasses complying with federal Food and Drug Administration standards are of prime concern to industry.

Streetwear impact-resistant lenses (invariably mounted in ordinary dress frames) are still used as safety glasses, but these streetwear lenses do not meet requirements. Specifically, these glasses:

- Meet no thickness requirements;
- Must resist only the impact of a 3/8-inch diameter steel ball dropped 50 inches (as opposed to the Z87 test of a 1-inch ball dropped the same distance);
- Can be mounted in any kind of frame, without regard for the important design and strength requirements stipulated for safety frames in the Z87.1 standard.

Contact lenses sometimes provide a superior means of visual rehabilitation for employees who have had a cataract removed from one or both eyes, who are highly nearsighted, or who have irregular astigmatism from corneal scars or keratoconus. Except for situations in which there are significant risks of ocular injury, individuals may wear contact lenses in the workplace.

Generally speaking, contact lens wearers who have experienced long-term success with contacts can judge for themselves whether or not they can wear contacts lenses in their occupational environment. However, contact lens wearers must conform to the regulations and directions of management regarding contact lens use. When the work environment entails exposure to chemicals, vapors, splashes, radiant or intense heat, molten metals or a highly particulate atmosphere, you should restrict contact lens use accordingly. Make contact lens use considerations on a case-by-case basis in conjunction with the guidelines of the OSHA and the National Institute for Occupational Safety and Health (NIOSH).

Prevent Blindness America makes these recommendations to management that directs contact lens use and the employees who wear them.

- 1) Individuals in designated areas should wear occupational safety eyewear meeting or exceeding ANSI Z-7.1 — the American National Standard Practice for Occupational and Educational Eye and Face Protection — at all times.

- 2) Advise employees and visitors of defined areas where contacts are allowed.
- 3) At workstations where contacts are allowed, the type of eye protection required should be specific.
- 4) Develop a specific written management policy on contact lens use with employee consultation and involvement.
- 5) Restrictions on contact lens wear do not apply to usual office or secretarial employees.
- 6) Develop a directory that lists all employees who wear contacts. Maintain this list in the plant medical facility for easy access by trained first-aid personnel. Inform supervisors of employees who wear contact lenses.
- 7) Train medical and first-aid personnel trained in the proper procedures and equipment for removing both hard and soft contacts from conscious and unconscious workers.
- 8) Require employees to keep a spare pair of contacts and/or a pair of up-to-date prescription safety spectacles (meeting the Z-87.1 standard) in their possession. This will allow employees to continue performing their job functions, should they damage or lose a lens while working.
- 9) Instruct employees who wear contact lenses to remove contacts immediately if redness of the eye, blurring of vision or pain in the eye associated with contact lens use occurs.

First aid for eye injuries

A good general rule in treating eye injuries is to get professional care, fast! However, first-aid treatment also is important.

The most common eye accident calling for first aid is something in the eye such as a particle of dust, wood, glass, metal, concrete or any other hard substance. Chemical particles, vapor and radiant energy are other causes of eye injuries. The natural impulse is to rub the eye. Don't! That can be

the worst thing to do. Rubbing a hard, sharp particle against the delicate tissues that line the inside of the eye can cause more damage.

The following do's and don'ts in the case of eye injuries are based on recommendations listed in the "American Red Cross First-Aid Textbook." Every workplace, home, store, office and school should have one.

- Never rub the eye. Too often this will drive a foreign body deeper into the tissues and make removal difficult.
- Never examine an eye for a foreign body until you have washed your hands thoroughly, because dirt might enter and make the injury worse.
- Never be rough, because this may aggravate the injury to the eyeball.
- Never remove a foreign body with a toothpick, match, knifeblade, magnet or any other instrument.
- Always send the patient to a physician if the foreign body is embedded in the eye.

The measures below are often effective in removing a foreign body that is not actually embedded.

1. Pull down the lower eyelid and see if the body lies on the surface of the lid's lining membrane. If it does, lift it off gently with a cotton swab or other applicator moistened with water. (Never use dry cotton around an eye.)
2. Grasp the lashes of the upper lid gently between the thumb and forefinger, have the patient look upward, and pull the upper eyelid forward and downward over the lower eyelid. Tears can often dislodge and sweep away foreign body on the lining membrane of the upper lid.
3. Flush the eye out with clean water. Do this with a small bulb syringe or with an eyedropper. Never, under any circumstances, should you use oil of any kind in first-aid treatment.

If the foreign body is still present or embedded in the eyeball, send the patient promptly to a physician. A retained foreign body may cause tissue changes and scars to develop. In some cases this may cause loss of sight. Remember, inflammation in one eye may set up sympathetic inflammation in the other.

In case of a serious injury, apply a pad of clean cloth gauze or a sterile oval eye pad to the eye. Cover both eyes during the time when the accident victim is enroute to the physician's office.

4. If the accident victim is in deep shock or a coma, close the eyelids to prevent visual damage that might result from drying of the eyeballs. If the lids fail to stay closed, they should be covered with a gauze pad or held shut with adhesive tape.

What to do in case of other injuries to the eyelids

The best advice is to take the victim immediately to a doctor. Damage to the lids can result from non-expert care. The only recommended first-aid treatment is the application of a clean cloth or gauze pad, or a sterile oval eye pad, held in place with a firm bandage.

What to do in case of burn

Heat, chemicals, gases or chemical particles may cause burns to the eye. When an open flame approaches the eyes, the lids usually close involuntarily, fast enough so that only the lids are affected. Burns of the eyelid, however, can be serious; they may damage the tear ducts and cause scar tissue.

Chemicals such as acids, alkalis, anhydrides and detergents may spurt into the eyes before the lids can close, causing severe damage.

Treat burns of the lids or eyes immediately by flushing with clean water. Get large quantities of water gently into the eyes as quickly as possible.

The following is one flushing method:

- Tilt the patient's head toward the injured side and then pour clean water slowly into the eye while you hold the lid open. Use an ordinary glass or cup or if available, a small funnel to direct the stream. Pour liquid into the inner corner of the eye and allow it to run over the eyeball and under the lid for at least 10 minutes. Make sure you flush thoroughly all parts of the eye, corners and under the lid. After flushing, place a simple

patch — preferably, a sterile oval pad—should be placed over the eye, or eyes, and take the patient quickly to an eye physician. Use no medication in first-aid treatment.

Correct defective vision

Defective vision, if not found and corrected, is a potential cause of many accidents. In the United States alone, approximately 100 million people wear corrective lenses. Eye doctors assert that sooner or later everyone needs them.

A person may have defective vision without realizing it. Changes usually develop slowly. Eyes may lose their sharpness and everything may become a little fuzzy or a little blurred without being noticed. Regular eye examinations can help maintain good eye health.

Vision testing

Although most jobs require vision tests to measure specific abilities (for example, where machining, measuring and assembly to very close tolerances are required), test all workers for these primary visual skills:

- Central visual acuity at distance – ability to see test targets clearly at 20 feet;
- Central visual acuity at near point - ability to see test targets clearly at 13 to 16 inches;
- Muscle balance and eye coordination – ability to keep eyes in balance, to prevent one eye from deviating vertically or horizontally; ability of eyes to relay images from various distances;
- Depth perception – ability of the eyes to judge the relationship of objects in space;
- Color discrimination – ability of eyes to judge colors correctly.

Proper lighting is indirectly, but importantly, related to eye protection and correction of defective vision among workers in industrial plants.

Obviously, poor lighting of equipment, aisles and other parts of the work area can cause many forms of industrial accidents.

