



## Head, Eye, and Foot Protection for Farm Workers

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**T**he National Safety Council estimates that approximately 160,000 agricultural workers suffer disabling injuries each year. That's a conservative estimate—countless other accidents are never reported. Many farm injuries could be prevented or their impact reduced if farmers wore proper personal protective equipment.

This fact sheet discusses three types of personal protective equipment: protective headwear, eyewear, and footwear. Head protection designed to reduce the force of impact from falling objects can mean the difference between suffering a mild concussion or having permanent brain damage. Eye injuries, which can have a direct and dramatic effect on our quality of life, could be cut by as much as 90 percent if farmers took the time to put on a pair of goggles before using a chainsaw or repairing farm machinery. Our feet are also very delicate and susceptible to injury without the proper protection. They're made up of 26 fragile bones with very little natural padding. Safety footwear can protect our delicate feet.

### Head Protection

In 1870, a worker stuffed a derby with paper, hoping it would help protect him against falling objects on the job. Today, computers are helping engineers design stronger, more comfortable hats to protect workers. Hard hats reduce the force of impact from falling objects such as tools and pieces of wood. Bump caps protect workers from ordinary bumps and scrapes sustained when working in close quarters or under low ceilings. Farmers should wear head protection when performing everyday tasks such as building, demolishing, or repairing structures; operating and repairing machinery; felling or trimming trees; and when entering or exiting buildings with low door headers.

Hard hats generally consist of a hard shell made of aluminum, fiberglass, or plastic and a suspension system made of plastic, nylon, or a combination of the two. Most shells today are made of lightweight thermoplastic resins, which are highly resistant to impact and have good dielectric (nonconductor of electric current) properties. The suspension system is the energy-absorbing mechanism and usually has crown straps that fit over the head, an adjustable headband, and protective padding. In general, nylon suspensions provide the greatest comfort and reduce the force of impact the best. Most hard hats have a sweatband for comfort around the forehead. Waterproof cotton or polyester blend linings are available for warmth in winter. Other accessories include earmuffs, welding helmets, and face shields. Most hard hats cost between five and ten dollars with accessories adding to their utility and cost.

Bump caps are lightweight with a thinner shell than hard hats and no suspension system. They are made to protect workers from bumps and minor head injury in areas with little headroom or low-hanging machinery. *They provide no impact protection and should not be worn in areas where falling objects are a risk.*

### Standards for Head Protection

The American National Standard Institute (ANSI) outlines performance standards for hard hats but not for bump caps. The standard categorizes helmets into three groups: Class A helmets reduce the force of impact of falling objects and the danger of contact with exposed low-voltage conductors; Class B helmets reduce the force of impact of falling objects and danger of contact with exposed *high-voltage* conductors; and Class C helmets reduce the force of impact of falling objects but offer no electrical protection.

Other tests measure flammability and water absorption. Hats must also meet certain physical requirements that affect worker comfort. For example, all materials that come into contact with the wearer's skin must be non-irritating; ventilation is required between the headband and shell; headbands must be adjustable in 1/8-inch increments; and hats cannot exceed 15.5 ounces in weight.

All hats meeting ANSI standards are labeled inside the shell in the following way:

Manufacturer  
ANSI Z89.1--1997  
Class \_\_\_ (A, B, or C)

## Hard Hat Maintenance

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Periodically check the hat for damage, such as dents and cracks. *Never use a damaged hat.* Either replace any replaceable parts or buy a new one. Don't try to fix hats with adhesives; there is no reliable way to ensure that dielectric or impact qualities will be retained.

Never store a hat where it will be exposed to sunlight, such as on the back shelf of a vehicle. Ultraviolet light can damage and weaken nonmetallic materials such as plastic; what most hard hats are made of today. Ultraviolet damage first shows as dullness in the shell called chalking. Then the surface starts to flake away and degrade. A hat exhibiting these signs should be replaced immediately.

## Signs of and Treatments for Head Injuries

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The brain is one of our most fragile organs; it merely floats inside the skull and is attached to it by a network of delicate fibers. A jolt to the head can tear blood vessels inside the brain and cause swelling, which can reduce blood flow throughout the brain.

If a coworker suffers a head injury serious enough to cause unconsciousness, they probably have some sort of brain injury. Contact help immediately. If the victim is unconscious for only a few minutes, they probably have a mild concussion. He or she may be disoriented or confused after waking. Normal functioning usually returns after 45 minutes or so. If the person is still unconscious after 45 minutes, the injury is more serious. The victim may have rapid, deep breathing or a slow pulse; both caused by rising pressure inside the skull.

Evidence of a brain injury may not surface for several hours. After a head injury occurs, no matter how minor the incident might seem, the victim should

be monitored for 48 hours. Look for the following ten signs: fluid or blood coming from the nose or ears; bruising around the eyes or ears; persistent vomiting; large or unresponsive pupils; loss of coordination; difficulty speaking; severe and worsening headache; double vision; excessive drowsiness; and convulsions. These signs can indicate anything from a cracked skull to increased pressure inside the skull. Seek help immediately.

If a coworker suffers a head injury, try to keep him or her still until help arrives. If the victim isn't breathing, check for a pulse and administer CPR if necessary. *Never* apply pressure to a bleeding head wound; it may push bone fragments into the brain. Instead, lightly apply a clean, soft cloth.

## Eye Protection

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Eye injuries are expensive, painful, and can cause partial or total blindness in one or both eyes. Simple precautions can be taken to prevent them.

Most eye injuries result from flying particles. The eye's natural protection—the surrounding bone structure, eyelashes, tearing, and blinking—are no match for high-speed particles and objects. Farmers should wear eye protection when grinding feed, handling chemicals, harvesting crops, haying, and doing shop work such as drilling or sawing. Also wear protection when building, demolishing, or repairing structures; repairing farm vehicles and machinery; welding and cutting with torches; and working in dusty atmospheres.

Basic safety glasses provide protection when there is risk of particles flying directly into the eye. They do not offer side protection. Safety lenses worn in streetwear eyeglass frames are not considered suitable safety glasses. Proper safety frames have grooves into which the safety lenses fit, preventing the lenses from popping out either forward or backward into the eye.

Most safety glasses are available with either permanent or detachable side shields to protect above, below, and to the sides of the eyes. When selecting glasses with side shields, make sure they do not interfere with peripheral vision.

Prescription safety glasses are available in a variety of frame styles—both plastic and metal. Bifocals and tinted lenses are also available. Variable tint lenses should be used with caution, however, since the tinting does not always go away instantaneously. This could be dangerous when going frequently from the indoors to the outdoors. Tinted lenses should be selected only when expected activities could involve bright flashes of light (e.g. welding).

Goggles fit snugly around the eyes, providing protection from all angles. They are good when doing chainsaw work, chipping, riveting, and grinding. If you wear prescription glasses, most goggles will fit around them. Goggles are usually ventilated and treated with an antifog liquid. They are also available in eyecup and wire mesh models. Goggles are inexpensive—about five dollars per pair. Keep a pair next to each machine or work area where eye protection should be worn. If working with chemical liquids, be sure the goggles have off-set ventilation ports.

Face shields protect workers from heat, glare, and flying objects but they are only considered secondary protection and must be worn with either glasses or goggles. Face shields that attach to hard hats are available for jobs that also require head protection.

Welding generates strong ultraviolet and infrared rays that can permanently damage eyes and cause blindness. Welding helmets have special filtering lenses that protect eyes from these intense rays. They are also available in models that mount on a hard hat. Welding goggles with various filter lens shades protect against sparks, rays, and flying particles. Consult a dealer to determine the filter lens shade needed for the type of welding being done. Welding helmets and goggles are available with either stationary or lift-front lenses. Some helmets have ratchet-controlled headbands for proper fit and absorbent sweatbands for comfort.

## Eye Protection Standards

ANSI also publishes a standard for eye protection: eyewear meeting the ANSI standard is marked with the

manufacturer's name and Z87.1

Lenses undergo three tests: a high mass impact test, high velocity impact test, and penetration test. The tests vary slightly for the various kinds of protective eyewear. All devices are also tested for flammability, corrosion resistance, and cleanability.

## First Aid for Eye Injuries

The chart below summarizes what to do and what not to do to properly treat an eye injury.

## Protective Eyewear Precautions and Maintenance

Protective eyewear should be cleaned regularly in warm, soapy water. Looking through dust buildup puts unnecessary strain on the eyes. Dry lenses with a soft tissue to avoid scratching.

Also inspect eyewear regularly for damage. Look for deep scratches or pitting that may weaken lenses. Replace elastic goggle headbands when they become stretched and slack. When not in use, store eyewear in a rigid case to prevent dust buildup and accidental damaging of delicate parts, such as frames and nose pads.

Have eyes examined regularly to determine if you need prescription safety glasses or a stronger prescription. Contact wearers should always wear protective eyewear in hazardous environments. In general, contact lenses are not recommended because they may trap particles in the eye, posing additional risks to the wearer; this is especially true in dusty environments.

Injury	What not to do	Proper Treatment
Foreign particle in the eye.	Do not rub eyes—rubbing can scratch the eye or embed the object.	Flush eye with water until object rinses out. If this doesn't work, bandage the eye loosely and seek medical attention.
Object embedded in the eye.	Do not try to remove the object.	Bandage eye loosely and seek medical attention.
Cut near the eye.	Do not rub, press, or wash the cut—may cause further damage.	Bandage eye loosely and seek medical attention.
Bump or bruise near the eye.		Apply a cold compress for 15 minutes to reduce pain and swelling. Seek medical help.
Welding arc burn.		Keep eyes closed and seek medical help. Note: Victim may not feel pain right away. Four to 12 hours later, eyes may be sensitive to light or may be red and swollen.

## Protective Footwear

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Safety shoes these days don't look like safety shoes. They're available in a variety of popular styles, such as dress shoes, tennis shoes, hiking boots, cowboy boots, and loafers—both for men and women. Manufacturers realize that people won't wear shoes that aren't comfortable and are making them more lightweight with cushioned insoles and arch supports. For farmers, safety pac boots, chore boots, and work boots are available.

Farmers have received foot injuries from animals stepping on their feet, dropping heavy objects on their feet, and stepping on sharp objects. For the most protection, farmers should always wear safety shoes when working.

Safety shoes usually have much more than just a steel-toe cap for protection. Steel shanks help distribute weight more evenly, providing support during such tasks as climbing a ladder. Metatarsal guards either fit over the top of the shoe or are built into the shoe to protect the top of the foot. Steel midsoles, either built-in or slip-in, protect against punctures and bone bruises from nails, glass, barbs, and stones. Slip-resistant soles help prevent falls in

wet barns and on muddy ground. For winter, slip-in felt liners are available for most styles of boots.

## Standards for Safety Footwear

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ANSI also establishes performance requirements and testing methods for protective footwear. Requirements are specified for qualities such as impact resistance, and puncture resistance.

Shoes can be marked with one of three impact ratings and one of three compression resistance ratings. The impact ratings are 30, 50 and 75, according to how many foot-pounds the steel toe can withstand upon impact. The compression resistance ratings are also 30, 50, and 75. The steel toe on a 30 shoe will withstand 1,000 pounds of static pressure, a 50 will withstand 1,750 pounds of pressure, and a 75 will withstand 2,500 pounds of pressure. The best protection is provided by the highest rated shoe, but even the lowest rated shoe offers substantially more protection than any non-rated shoe.

Steel midsoles designed to provide puncture protection must extend from the toe to the heel of the shoe and withstand a minimum force of 270 pounds to penetration. Midsoles are also tested for corrosion.



*Examples of the variety of styles of safety shoes available.*

## Conclusion

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Protective headwear and eyewear are generally inexpensive—most hard hats and eyewear range from five to ten dollars. Though protective footwear is more expensive, it is by nature very durable and a worthwhile investment.

Look for the ANSI insignia on protective equipment. Compliance with the standards is voluntary, so if a product is labeled as meeting an ANSI standard, the manufacturer has gone the extra mile to make sure that it performs well.

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