

Protecting Your Eyes

For \$10 or less, comfortable eye wear will guard against common job-site hazards

by Scott Gibson

Some years back I was putting my young son to bed when he reached up to hug me and inadvertently stuck his fingers squarely in my right eye. The gouging pain was like nothing I'd ever felt before. Hours later, I still couldn't hold my eye open for more than a few seconds, and early the next morning a neighbor drove me to the emergency room. A doctor pried open the eye, inspected the damage and told me the eye probably would be fine in a week or two.

It actually took more than six months for the small tear in my cornea to heal completely. In the meantime, I had plenty of time to think about all of the stupid chances I had taken with my eyes. I also heard plenty of stories from other people about eye injuries they had suffered. A builder I knew told me he'd spent six months in a dark room after injuring his eye. A cedar shingle he was prying from the side of a house popped off and hit him in the face. A nail sticking through the shingle did the damage. Other people had similar stories (sidebar p. 84).

The poke in my eye caused no permanent harm, but it was fair warning. Trying to find a pair of good safety glasses, though, was virtually impossible. The selection in hardware stores, lumberyards and tool catalogs wasn't good. What few pairs of specs they had to choose from were cheap, flimsy affairs that fit badly. I know now that I was just looking in the wrong place. A number of manufacturers do offer light, well-built safety spectacles, goggles and face shields that are comfortable to wear (top photo, facing page). A good pair of safety glasses or goggles can be had for less than \$10. You can buy plain or prescription lenses, either clear or tinted (Sources of eye protection, p. 85). Coatings help keep lenses from fogging up or getting scratched, and most safety eye wear blocks ultraviolet (UV) light, even if the lenses are clear. Maybe best of all, manufacturers are trying to package all of these features in a pair of specs you'll wear.

Lenses and frames should resist impact-

Job sites are rife with opportunities for ruining your eyes: errant nails, broken drill bits, flying chunks of stone or concrete, sheared-off drywall nails, glues, finishes and paint strippers. The list is endless. So you don't want a pair of goggles that can't meet a performance standard set by the American National Standards Institute (ANSI) called ANSI Z87.1-1989 (a similar Canadian code is called CSAZ94.3).

Safety eye wear that meets the standard must

withstand several impact tests, some for the frames and others for the lenses. Manufacturers or testing labs drop weights, steel balls and weighted needles on eye wear to make sure it won't come apart or throw chips or shards of plastic or glass into your eyes in the event of a real accident (photo below). If the lenses in the goggles, face shield or specs break, or if the frames fail or separate from the lenses, the product flunks the test.

Hardened glass was once the material of choice for safety eye wear, and it's still available. But plastics, principally polycarbonate, have just about taken over. Polycarbonate is a tremendously resilient material that can be formed into either nonprescription or prescription lenses. It's lighter and more impact-resistant than hardened glass. But no matter what the material, nonprescription lenses must be at least 2-mm thick and prescription lenses at least 3-mm thick to meet the ANSI standard.

Although plastic resists impact better, hardened

glass still may be the right choice if the work environment is harmful to plastics. For instance, where lots of abrasive grit or solvents such as acetone will be encountered, and repeated cleaning may be on the corner of your T-shirt, hardened glass will stand up better than plastic. One disadvantage to glass, though, is that when it does get scratched, it gets weaker. That's not true of plastic lenses.

Regular glasses don't cut it—I wear prescription glasses, what the safety industry calls "street wear," and I've figured more than once that they're probably good enough to stop wood chips, chunks of concrete and other eye hazards I might run into. Maybe I've just been lucky.

The lenses in my street-wear specs are probably a plastic called CR-39, thinner than that found in safety specs. The lenses might well fail standard tests for penetration or breakage. While street-wear specs may stop light wood chips or sawdust, they are not equipped with side shields to prevent material from getting into the eye from the side, and they might not stop a high-speed particle or a heavy one. If your street-wear specs have glass lenses that do not meet the ANSI standard, an impact could shatter the glass and drive the pieces into your eyes. You may not want to invest in prescription safety eye wear. For a lot less money, you can pick up a pair of safety specs designed to fit right over your street-wear specs (top photo p. 85).

Coatings and UV protection—Polycarbonate is resilient, but it's also soft. To overcome that shortcoming, manufacturers may add an antiscratch coating to extend the life of the lenses. Antifogging and antistatic coatings also are available. Coating and tinting technologies, in fact, seem to be two of the major areas of competition (along with fashionable design) among manufacturers of safety eye wear. Lenses may be clear, yellow, pink, green, gray or vermilion. Each tint is designed to improve vision in different kinds of light or to absorb some part of the light spectrum that's harmful.

Polysiloxane in one form or another is apparently the industry standard for antiscratch coatings. But manufacturers are not forthcoming about the process of applying and bonding the coating to the lens. For example, a Uvex manager cheerfully explained each step of the manufacturing process to me at the company's Rhode Island plant until we came to the production



The glasses passed the test. An inspector at a Uvex factory in Smithfield, R. I., tests a pair of safety frames by dropping a pointed weight on the glasses from a height of about 51 in. The lens stayed in the frame, and the frames were undamaged.

There was a time when all safety spectacles had that Buddy Holly look.



Newer styles, same protection. Manufacturers these days offer more updated styles with both clear and tinted lenses. All safety glasses used to look like those in the center foreground of this photo.



Buy the right goggles for the job. All of these goggles pass industry impact-resistance tests, but the pair in the foreground and the pair on the left also are resistant to liquids. Vents on the other two styles might not prevent splashed chemicals from getting into the eyes.



One meets impact test, one doesn't. These two types of visitor specs have a significant difference: One meets industry impact standards, and the other doesn't. The one on the right is labeled as not intended for primary eye protection. The specs on the left will meet impact tests.

area, where the antiscratch coating is applied. Like all visitors, I was politely steered away from that door.

Coatings that resist scratching, fogging and static, though well-bonded, can come off the lens through normal wear and tear. Proper care of the safety specs, which means wet-cleaning, not rubbing them on your jeans, helps make the eye wear last longer.

Most polycarbonate lenses contain special light absorbers that block UV light. These materials are added when the plastic resin is made; the

resin can be ordered from the supplier that way, and the UV treatment won't rub off. Even clear safety lenses may block enough UV light to meet the ANSI standard for sunglasses.

Goggles are best for some conditions—Polycarbonate lenses in goggles, safety glasses and face shields all have the same impact resistance. But there are differences worth considering. Goggles seal off the eye socket more effectively than either spectacles or face shields, and because goggles fit tightly against the face all the

way around, they distribute impact forces more evenly. Even though face shields and spectacles are available with brow guards that keep out material from above, they don't offer the same level of protection that goggles do.

Goggles come in two main varieties: impact-resistant and splash-resistant. The chief difference is in how the goggles are vented (middle photo, p. 83). Impact-resistant goggles have vents that are oriented so that they block solid material but still allow air to move behind the lens. The design prevents fogging. The hooded vents in splash-resistant goggle won't let liquids through. They would be the right choice when working around finishes or paint strippers.

Don't rely on face shield alone—Goggles or safety glasses do a good job of protecting your eyes but not the rest of your face. A blank of maple spinning off a lathe at high speed could do a lot of damage to nose, chin, cheeks or throat even if your eyes were fully protected. That's why some operations are done more safely with full face and brow protection offered by a face shield. Manufacturers offer clear or tinted lenses or face shields, which can be replaced if they get too scratched.

Jim Spahr of the National Institute of Occupational Safety and Health says a face shield should not be used without safety spectacles or goggles because material can find its way under or around a face shield (bottom photo, facing page). Spahr says face shields are more effective if equipped with top and bottom crowns; U.S. Safety, for instance, makes a face shield with plastic guards that protect the chin as well as the crown of the head. The top crown, or brow guard, protects the wearer from falling objects, glare and liquids. The bottom crown, Spahr says, provides additional protection to the chin and neck from flying debris and splatter.

Spectacles, plain and prescription—One manufacturer representative I spoke with laughed politely when I asked her if you can still buy old-fashioned safety specs like the ones you got in seventh-grade shop class. "We call them Buddy Hollies," she said. They're still around, but companies these days are touting safety specs quite a bit more rakish than that. Today's safety glasses may resemble Oakley sunglasses, those wrap-arounds favored by skiers, bicyclists and speed skaters on the forefront of athletic fashion.

In fact, safety eye-wear catalogs are jammed with stylish specs in neon colors, even wire-rims that don't look much different than street-wear specs. If the product is more attractive, more people will use it willingly. As the president of one company put it, "The biggest problem is getting people to wear something that people don't want to wear." This fashion-marketing strategy benefits users because the result is a much wider selection of safety glasses. That means the chances are greater of finding a pair that fits right and is light and comfortable enough to wear all day.

If you decide you want prescription safety glasses, they probably can be ordered through your optometrist. Lenses can be made from either polycarbonate, CR-39 or hardened glass, al-

Remembering an eye injury

by Larry Haun

I've been a carpenter for more than 40 years. I didn't know in the beginning that working safely is something to be taken seriously. I do now. Being safety conscious is simply something a good carpenter does full time. Otherwise, as they say, "One of these days, it will happen to you."

One of those days happened to me back in 1954, when I still thought I was invincible. I had to learn that even hammering nails can be dangerous. It was summer and hot, and we were framing houses. I had been wearing prescription lenses for a number of years. On hot days, sweat used to pour down over my glasses, making it difficult to see. Instead of grabbing a dry cloth to wipe my brow and clean my glasses, I laid them aside.

I can recall everything vividly. We were framing walls. I remember setting a nail in the top plate, hitting it with my hammer and the nail flying up and striking me in the right eye. It hurt some, but the pain was not intolerable. It was sort of like when a good-size piece of sawdust gets under your eyelid or when someone accidentally pokes a finger in your eye. I went over to the drinking water, wet a cloth and held it against my eye for a while. After a few minutes, I actually felt like I could go back to work. Not understanding what had really happened, I started framing again! I soon realized my vision was getting worse.

The year, 1954, was in the days before 911. We were working fairly close to a large hospital, so I got in my car and drove to the emergency room. When I got to see a doctor, it took her about 30 seconds to put in a call for an eye specialist. The news was not great. The nail had hit my eye point first and punctured the eyeball, and all the fluid in the eye was leaking out.

It wasn't long before I was rolled into an operating room. They gave me a local anesthetic, so I got to watch as they stitched my eye. They used a reverse

spring clamp to hold my eyelid open, and I could sort of see a curved needle coming down to my eye as the doctor plugged the hole. Then they put a cream under the lid, pulled both eyelids down and took a stitch in them so that I couldn't open either eye. After wrapping up my head like a mummy, they rolled me off to a hospital room. I was sure wishing I had taken the time to wipe the sweat off my glasses.

The next period was one of the hardest in my life. I had to lie flat on my back for 10 days and not move. I was given a liquid diet so that there would be no movement of facial muscles that might endanger the healing process. That was the bad part. The good part was that I learned what it is like not to be able to see. It was a time to put some of my life La perspective. Among other things, I made a firm resolution that I would not work in construction without proper eye protection.

After 10 days came the great unveiling. I was surrounded by a group of doctors as they peeled off the wrappings and took out the stitches. The hole in my eye was so dilated that it was hard for me to tell if my vision was going to be okay. At least I could see light. The doctors seemed pleased. They put more salve under my lid, stitched the right eyelid shut and put a bandage on it. Over this they put on a black bandit's mask with a hole about the size of a dime so that I could see out of my left eye. I felt a little strange wandering around looking like the Lone Ranger.

The good news is that the operation was a success. I had to wear the mask for a month, and my right iris was dilated for a year or more. I couldn't go out in sunlight without wearing dark glasses for many years. At night, stop lights looked like amoebas, but I could see! My hope in relating this story is that every reader will think twice about going to work without proper eye protection. A nail in the eye is truly serious business. It just isn't worth taking a chance.

—Larry Haun is a carpenter in Los Angeles, Calif.

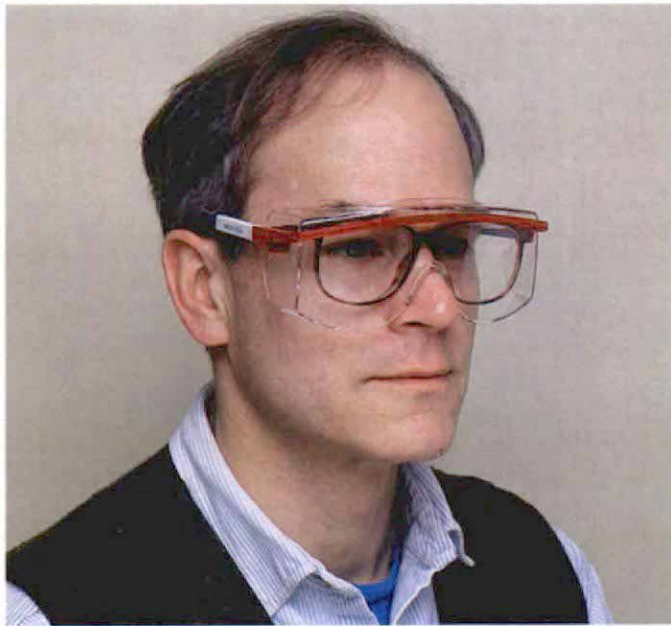
though polycarbonate CR-39 offers the greatest impact resistance. Safety frames may be metal or plastic. Frames are designed with heavier buttressing so that the lenses won't pop back toward the eye in reaction to impact. Frame styles range from the Buddy Holly look to much more fashionable versions that rival street wear.

The optometrist's shop where I bought my street-wear glasses had 22 pairs of safety frames in stock, and the people there said they could order others if I didn't see anything I liked. All of them were \$75. Safety lenses started at \$44 in CR-39, a plastic that can meet the ANSI standard but is not as impact resistant as polycarbonate. Polycarbonate lenses cost \$70. Safety bifocals also were available, though more expensive.

Know what you're buying—

Some American manufacturers test their own safety eye wear for compliance with ANSI Z87. Others hire independent labs. I wondered whether anyone looks over the shoulder of a company that does its own performance test. The answer is no; the industry is self-regulating. One exception is when the eye wear is sold in Canada. In that case, Canadian inspectors will visit the plant. Because of liability issues and the competitive nature of the marketplace, the experts I spoke with said manufacturers aren't likely to weasel on test results. This means products made in the United States and stamped as meeting the Z87.1 standard almost certainly do.

Some American manufacturers import at least part of their line of safety eye wear. Many of these imports come from Taiwan. But importers certify that the eye wear will meet ANSI standards, and a Pittsburgh laboratory that tests eye wear for American companies told me that the quality of lenses com-



Regular glasses alone aren't enough. Prescription-eyeglasswearers can buy prescription safety eye wear or look for safety spectacles made to slip right over regular glasses.



Use spectacles or goggles with a face shield. Because some face shields are open at the bottom and don't hug the face tightly on the sides, experts recommend that users also wear either safety spectacles or goggles at the same time.

ing from Taiwan is good. Just make sure that the eye wear is in compliance with the ANSI standard. The Z87.1 code should be stamped on the glasses or on the packaging. If not, call the manufacturer and check.

Visitor glasses (bottom photo, p. 83), those safety specs you might get on a factory tour, may not be coated for scratch resistance, and they may not meet the ANSI impact standard. But because these specs are worn for a short while in low-risk areas and then tossed, that probably doesn't matter as long as you don't use them on the job. Some manufacturers do make visitor specs that meet the ANSI standard. Either way, the package should be clearly marked.

Availability and cost—A good selection of safety eye wear may not be available in your local hardware store or lumberyard. One reason is that manufacturers concentrate their efforts on big industrial users, such as General Motors, which buy thousands of pairs at a time. Another reason is that consumers probably aren't demanding any better. They must assume, as I did, that the junk on the rack is all that's out there. One way to find better-quality safety eye wear is by looking in the Yellow Pages under safety equipment. I tried three companies in my area. Two of them didn't have much to choose from. But the third company was a bonanza: more than 100 pairs of safety glasses, goggles and face shields in stock. Or you might call one of the major manufacturers directly (listed below) and ask where their products are sold near you. It's worth the effort. □

Scott Gibson, a former associate editor at Fine Homebuilding, is now the managing editor for new products at the Taunton Press. Photos by Susan Kahn.

Sources of eye protection

H. L. Boaton Co. Inc.
P.O. Box G
Buzzards Bay, Mass. 02532
(800) 426-1881

Cabot Safety Corp.
90 Mechanic St.
Southbridge, Mass. 01550
(508) 764-5500

Crews
P.O. Box 751255
Memphis, Tenn. 38175-1255
(800) 821-6543

Glendale Protective Technologies
5300 Region Court
Lakeland, Fla. 33801
(800) 733-1177

U.S. Safety
8101 Lenexa Drive
Lenexa, Kan. 66214
(800) 821-5218

Uvex Safety
10 Thurber Blvd.
Smithfield, R.I. 02917
(800) 343-3411

Willson Safety Products
P.O. Box 622
Reading, Pa. 19603
(800) 345-4112