Are Your Safety Glasses Really Safe?

By Fred Leedy

There are some things that you can do (and not do) that will, most likely, prevent your gun from ever blowing up in your face; a good safety course will cover those things. But, even if you remain diligent in your personal safety practice, if you spend much time shooting you will be spending a lot of time within "missile range" of other shooters who may not be as diligent at safety as you are.

In recent years, the practice of reloading has increased, along with the potential for exploding guns; you can only guess at the quality control of that guy shooting reloads beside you. Combine that possibility with an influx of new shooters. What could possibly go wrong?

Without agonizing over "Murphy's Law", let's move on to the point of this paper: Safety Glasses.

Not all eyewear labeled "Safety Glasses" are suitable for shooting. When it comes to eyewear, the generic term "safety glasses" encompasses a wide range of performance and quality. For example, safety glasses that are designed to protect laboratory workers from liquid splatter might also be capable of protecting your eyes from dust or even a spent casing traveling at low velocity, but they would be very poor at protecting your eyes from the high velocity impact resulting from an exploding gun. The potential weight and speed of the debris is an important factor to consider when selecting the best eye protection.

Normal corrective lens', e.g. bifocals, do not provide suitable impact resistance for shooting. Also, normal eyeglass frames are not rated for use as safety glasses either. An eyeglass frame that is not properly rated is dangerous and can result in a serious eye injury if the frame breaks, dislodging the lenses.

Good safety eyewear should also protect your eyes from the side as well as the front; they should wrap around far enough to provide lateral protection from debris. In fact, if the glasses don't provide lateral protection, they probably are not rated for high-impact protection either.

Safety glasses can be configured to fit over your existing prescription eyewear. Soft stick-on corrective lenses are also available for applying to the lens of your safety glasses. There are options that allow for both safety and clarity.

Polycarbonate

Safety glasses may be constructed from a variety of materials that have a wide range of impact resistance and, as stated before, not all of them are suitable for shooting.

For shooting glasses, polycarbonate is an economical lens material that will provide protection from most debris that you might encounter. Polycarbonate was developed in

the 1970's for aerospace applications, and is currently used for things like helmet visors for astronauts and for space shuttle windshields. Eyeglass lenses made of polycarbonate were introduced in the early 1980's in response to a demand for lightweight, impact-resistant lenses. But, whatever the material, it should be tested and rated for the specific use that it will be put to.

Standards, Specifications, and Ratings for Safety Glasses; ANSI and/or MIL-SPEC

The American National Standards Institute (ANSI) is a private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States. The ANSI standard for eyewear that may be suitable for shooting is **Z87.1**, which describes the specific impact resistance rating of the eyewear. This standard is commonly used for shooting glasses and many other examples of protective eyewear. The ANSI standard may be the only rating listed on the typical "blister pack" safety glasses found hanging in the sporting goods department of your favorite store.

In addition to the ANSI standard, and probably more significant for shooters, are the Military Specifications (MIL-SPEC) that describe the essential military technical requirements for the way certain items perform in the real world. When it comes to eye protection while shooting, the requirements are essentially the same for both the military and civilian shooter. Noteworthy research and testing has been done by the military regarding eye protection. A military performance specification (MIL-PRF) states the requirements in terms of the required results with criteria for verifying compliance. A performance specification defines the functional requirements for the item, the environment in which it must operate, and interface and interchangeability characteristics.

The V_0 test rating

References to an eyewear's "ballistic" rating commonly refer to its ability to withstand impact at high velocity. There are many specific categories outlined in the MIL-PRF standards, but the most common ones referenced for eyewear ballistic/impact performance are known as the "V sub-zero rating"; the US Military's MIL V_0 standard provides resistance against shrapnel-like particles moving at speeds of at least 640 feet per second—projectiles that deliver seven times the energy of those used to test for the Z87+ standard.

MIL-PRF 3.5.1.1 Ballistic Resistance

The ballistic resistance of the spectacles shall be such that they will pass a $\mathbf{V_0}$ test using a 0.15 caliber, 5.8 grain, T37 shaped projectile at a velocity of 640 to 660 feet per second when tested as specified in 4.4.1.1 [below].

MIL-PRF 4.4.1.1 Ballistic Resistance

The test shall be a $\mathbf{V_0}$ test conducted as specified in MIL-STD-662 using a 0.15 caliber, 5.8 grain, T37 shaped projectile with the following exceptions: electronic velocity detection devices (light beam or acoustic type) may be used to determine the velocity of

the projectile, such devices placed no less than 8 inches and no more than 24 inches from the target; compressed gas propulsion of the projectile may be used. The eyewear shall be mounted on an Alderson 50th percentile male head form in the as-worn position. The 0.002 inch thick aluminum foil witness sheet shall be mounted within 2 inches of the eyewear behind the area of impact. The sample shall be hit once at normal incidence within an l-inch diameter at a point centered vertically and at a horizontal distance of 32 mm from the centerline. The sample shall be considered a failure if the aluminum foil witness sheet is punctured or if the sample is cracked.

Suitable safety glasses are available at very reasonable prices. They are available in different lens tint, sizes, shapes, and frame colors. It is possible to buy good quality, such as Honeywell's UVEX™ Genesis® line (see below), without overspending on "brand name" or "designer" features.

In summary, the safety glasses that you wear when shooting should at least meet ANSI Z87.1 (high impact) **and** the Military V_0 (ballistic impact) test standards. Some safety glasses advertise compliance with the ANSI Z87.1 standard, but not the Military V_0 standard; it is best to have both to insure that the eyewear has a high impact rating. It's difficult to tell the difference between a polycarbonate, such as Lexan™ lens, and a polymethyl methacrylate, such as Plexiglas™ or Lucite™ lens by just looking at them; the former might save your eyesight, while the later might not.

Be safe.