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EYEWEAR 101

ANSI Z87.1

This standard outlines the requirements for eye and face protection to protect workers from impact, non-ionizing radiation, and liquid splash exposures. It has been updated twice since 2003, with revisions in 2010 and 2015. This change focuses on product performance and has more closely aligned the US standard with international standards.

ANSI Z87.1-2015 continues to differentiate eye protection based on specific risks and places additional emphasis on allowing workers to choose the right eyewear based on their environment and potential hazards.

GENERAL REQUIREMENTS

The hazard organizes required protection based on encountered hazards. The most common hazards include:

- Blunt impact
- Radiation
- Splashes and droplets
- Dust
- Small dust particles

Look for markings and packaging which outline what specific hazards each eyewear is designed to protect against. Most common safety glasses are designed to protect against blunt impact.

IMPACT TESTING

There are four different tests for this standard. The lowest level test is a 1 inch steel ball that is dropped on the lens from about 50 inches. This is similar to getting hit in the eye with a golf ball thrown from a few feet away. This provides good protection but does not qualify the glasses for high impact.

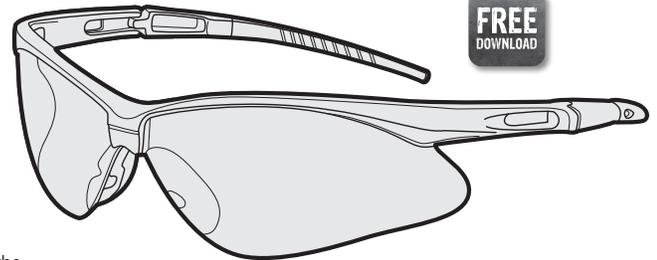
For that type of work, you have to have a lens stamped with a Z87+ marking. To qualify for the plus rating, they must pass the following three tests.

First, a 0.25" steel ball is fired at 6 specific locations on the lens at about 150 feet per second, roughly 100 miles per hour. Essentially getting shot in the eye with a BB gun.

Second is a high mass impact test with a 17.6 ounce steel missile shaped object, weighing just over a pound, or 500 grams. This is also dropped from 50 inches and is equivalent to being hit in the eye with a hammer.

Finally, a penetration test. For this, a sharp needle weighing 1.56 ounces is dropped onto the lens from 50 inches.

If during all of these tests, no part of the eyewear breaks or fragments from the frame, and no part



of the eyewear comes apart, it qualifies for the 87+ stamp.

There is also a military ballistic standard, which has to stop a .15 caliber round fired at 640 feet per second.

MARKINGS

The ANSI standard requires easy-to-understand lens and frame markings. These make selecting and identifying compliant eye protection easy. All markings must be clearly and permanently marked on the frame and lens.

IMPACT: Z87+ indicates high-velocity impact. Z87 alone means basic impact

SPLASH & DROPLET: D3 for splash and droplet

DUST: D4

FINE DUST: D5

WELDING: W plus a shade number

UV: U plus the scale number

INFRARED LIGHT: R plus the scale number

VISIBLE LIGHT FILTER: L plus the scale number

PRESCRIPTION: Z87-2 on the front of the frame and both temples

HEAD SIZE: H indicates products designed for smaller head sizes

OTHER: V for photochromatic and S for special lens tint

