Safety Eyewear and ANSI Standards – Seeing is Believing!

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Introduction

This presentation will bring new meaning to the phrase “seeing is believing.” It is not often understood what qualifies eyewear to be labeled as safety certified. Sometimes it is not even understood there are standards governing safety eyewear. This course will equip attendees with increased knowledge and understanding in the following areas: reasons to use safety eyewear, features available and technologies used to produce safety eyewear, meeting safety standards, meeting testing requirements, and understanding standards enforcement.

This presentation will provide the tools for safety professionals to make informed decisions as they work to decrease company liability and protect the eyes of employees. There are no prerequisites for this course, simply a desire to become educated and informed about safety eyewear and the standards enforced within the industry.

Audience

The general audience of this presentation will consist of individuals who wish to know more about safety eyewear, industry accident statistics, ANSI and MCEP standards, testing to meet these standards, and solutions to reduce risk and exposure. Specifically, the audience will be comprised of three different types of people:

1. Safety directors and safety committee personnel
2. Salespeople and distributors of safety eyewear
3. Individuals working in industries that require safety eyewear.

Learning Objectives

1. Why it is important to wear safety rated eyewear
2. What it takes for glasses to be safety rated
3. What the ANSI and MCEPS standards mean
4. Which tests ANSI and MCEPS standards require for safety rated eyewear
5. Who can test to ANSI standards
6. Myths associated with standards enforcement

Reasons to Become Certified
Safety professionals will gain the following from attending this course:

1. An awareness of safety standards and ability to educate others
2. Ability to reduce company liability and increase policy compliance
3. Value from additional certification and fulfill annual requirements
4. Ability to generate company cost savings and increase use of safety eyewear
5. Ability to reduce eye injuries both on and off the job

Salespeople and distributors will gain the following from attending this course:

1. Increased sales through increased customer awareness and education
2. Increased credibility with customers as a safety eyewear consultant
3. Build customer loyalty by
   a. Helping customers reduce company liability and increase policy compliance
   b. Helping customers reduce eye injuries on and off the job

Presentation Outline

Standards: Why Test?
According to the Center for Disease Control, more than 10,000 eye injuries occur in the USA every day. The Department of Labor has reported that approximately 2,000 of these injuries require medical treatment and time off work, and the Bureau of Labor claims that 85% of these cases require up to five days off work.

While it is not surprising that eye injuries happen on the job site, many are shocked to learn that 63% of all eye injuries happen away from work: 47% occur at home and 16% while playing sports. In an effort to decrease the frequency of injuries, the American National Standards Institute (ANSI) created a series of voluntary tests to determine the durability of safety eyewear.

What is ANSI Z87.1-2010?
ANSI 87.1-2010 is the American National Standards Institute’s current standard for high impact eye protection. In 1922, the War Department, Navy Department, and National Bureau of Standards created the first edition of the Z2 Standard for eye and head protection. Over many decades, these testing standards have been revised and improved, resulting in today’s ANSI Z87.1-2010 requirements. Edge Eyewear has added a “+” to the Z87.1 markings to indicate that its eyewear is compliant with the high impact level of the standard, which is referred to as “Z87+”.

What is Military MCEPS GL-PD 10-12?
The current Military Combat Eye Protection Systems (MCEPS) standard is called MCEPS GL- PD 10-12, which superseded the MIL-PRF-31013 standard in April of 1996. This standard mandates ballistic fragmentation tests to determine eyewear compliance. The MCEPS standard of
tests are much more intense than that of ANSI in order to simulate projectiles and dangers faced in combat. MCEPS GL-PD 10-12 is often referred to as the ballistic standard.

**Impact Testing**

Shown below are some of the many tests required by ANSI and MCEPS to determine the integrity and strength of a complete spectacle. Protective eyewear must pass all of these tests and many others to be compliant with current ANSI and/or MCEPS standards. All Edge Eyewear glasses are independently tested by accredited COLTS Laboratories.

*High Mass Impact Test*

Spectacle frames and lenses must be capable of resisting a 500 gram (17.6 oz) spike that is dropped from a height of 127 cm (50 in) (ANSI 2010, Section 6.2.2). See Exhibit 1.

Exhibit 1. An image of a spike weighing 500 grams (17.6 oz.) that is dropped from 127 cm (50 inches) onto the frames and lenses for the high mass impact test.

*Penetration Test*

Lenses must be capable of resisting penetration by a weighted needle with a total weight of 44.2 grams (1.56 oz) dropped from a height of 127 cm (50 in) (ANSI 2010, Section 6.2.4).

*High Velocity Impact Test*

Spectacle frames and lenses must be capable of resisting impact from a 6.35 mm (.25 in) diameter steel ball traveling at a velocity of 45.72 m/s (150 ft/s) (ANSI 2010, Section 6.2.3).

*Military MCEPS Test*

The same process applied in the High Velocity Impact test is used, but the speed is increased to 660 ft/s, simulating a shotgun blast from a distance of 33 feet.

*What Constitutes a Failure?*

When each type of test is conducted as indicated in Sections 6.2.2, 6.2.3, and 6.2.4 of ANSI Z87.1-2010, a complete device will fail if any of the following occurs:

1. A piece fully detaches from the inside of the lens
2. Fracturing
3. Penetration of the inside of the lens
4. Lens is not retained by the frame
5. Lens and/or frame touches the eye, even if the glasses remain intact

**Optics Testing**
To prevent light distortion and determine the clarity of the lens, ANSI Z87.1-2010 standards require a variety of optical tests to be administered before lenses are considered compliant. A number of these tests are illustrated below.

**Luminous Transmission Test**
This is an examination that measures Visual Light Transmission (VLT), which is the percentage of light that passes through a lens. Clear lenses must have a minimum of 85% VLT. Tinted lenses must have a minimum of 8% and a maximum of 85% VLT (ANSI 2010, Sections 5.1.2 & 7.1.2). See Exhibit 2.

Exhibit 2. Illustrated is a graph of the VLT of a tinted lens across the light spectrum.

**Resolving Power Test**
This test of focus measures the ability of a lens to form separate, distinct images of objects that are close together. A failure is defined as the inability to distinguish three separate lines at the 20-line mark on an NBS pattern, both vertically and horizontally (ANSI 2010, Section 5.1.4).

Exhibit 3. Illustrated is the NBS pattern, of which the lines at the 20 mark must be clear and distinct during the resolving power test.
Refractive Power Test
This optical clarity test measures the ability of a lens’ entire surface area to focus on the rays of a sunburst pattern without blurring or blending. A failure is defined as refraction of light ± .06 diopters (ANSI 2010, Section 5.1.4).

Astigmatism Test
This test looks for improper lens curvature or flat areas that create a difference in refractive power. A failure is defined as ≥ .06 diopters difference (ANSI 2010, Section 5.1.4).

Prismatic Power Test
This test measures the angular deviation of a ray of light after it passes through a lens, similar to the way light refracts and bends through a prism. A failure is defined as ≥ .5 diopters of deviation (ANSI 2010, Section 5.1.4).

Application of Standards & Conclusion
The goal of safety standards is to enable people to wear safety eyewear. When 63% of eye injuries happen off the job site, the goal is to persuade people to wear safety eyewear both at home and at work. The best safety glasses are the one that people will wear, and Edge Eyewear prides itself in enabling people to work safer, both on and off the job. Edge Eyewear not only meets ANSI and MCEPS standards but also merges cutting edge technology with contemporary fashion to create designer quality safety eyewear. Edge offers a variety of lens options in comfortable and durable frame styles to make it easy to protect your eyes.

Bibliography