



Abstracts

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Assessing PPE Protection - Development of a Safety Eyewear Coverage Coefficient

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With nearly 2,000 medically-treated occupational eye injuries each day, there is a continuing effort by employers and others to increase safety eyewear usage. Among eyewear manufacturers, varying safety spectacle style has been a focal point for increasing usage. Whereas the current eye and face protection standard, ANSI Z87, ensures minimum impact resistance and various optical properties independent of style, it does not provide performance guidelines for eyewear coverage-an important parameter considering the number of eye injuries that occur from flying or falling particles while a worker is wearing safety spectacles.

To develop safety eyewear coverage guidelines, we have developed a lab-based measurement of an eyewear coverage coefficient by using 3-D laser scanning of safety spectacles on standardized headforms. We use a combination of CAD software and a custom program developed at NIOSH to "fit" the digital headform and eyewear data together and then calculate the number of particles blocked from reaching the eye area by the safety eyewear. The ratio of the number of particles blocked by the eyewear to the number of particles that would contact the eye area (without safety eyewear) is termed the coverage coefficient and potentially varies from 0 (no coverage) to 1 (complete coverage). To date, we have measured coverage coefficients on 25 pairs of safety eyewear and for three Alderson headforms (5%, 50%, and 95%). We chose eyewear styles to be representative of the most popular designs worn in the workplace. We also included styles marketed to select "large" or "small" populations.

When examining coverage of safety eyewear for the standard Alderson 50% headform, the coverage coefficient values for the 25 pairs of eyewear varied from 0.51 to 0.97. The average for this group was 0.88 with a standard deviation of 0.08. For the Alderson 5% headform, the coverage coefficient range was 0.65 to 0.99 with an average of 0.95 and a standard deviation of 0.06. For the "large" headform, the Alderson 95%, the coverage coefficient varied from 0.54 to 0.97 with an average of 0.89. The standard deviation for this sample was 0.07.

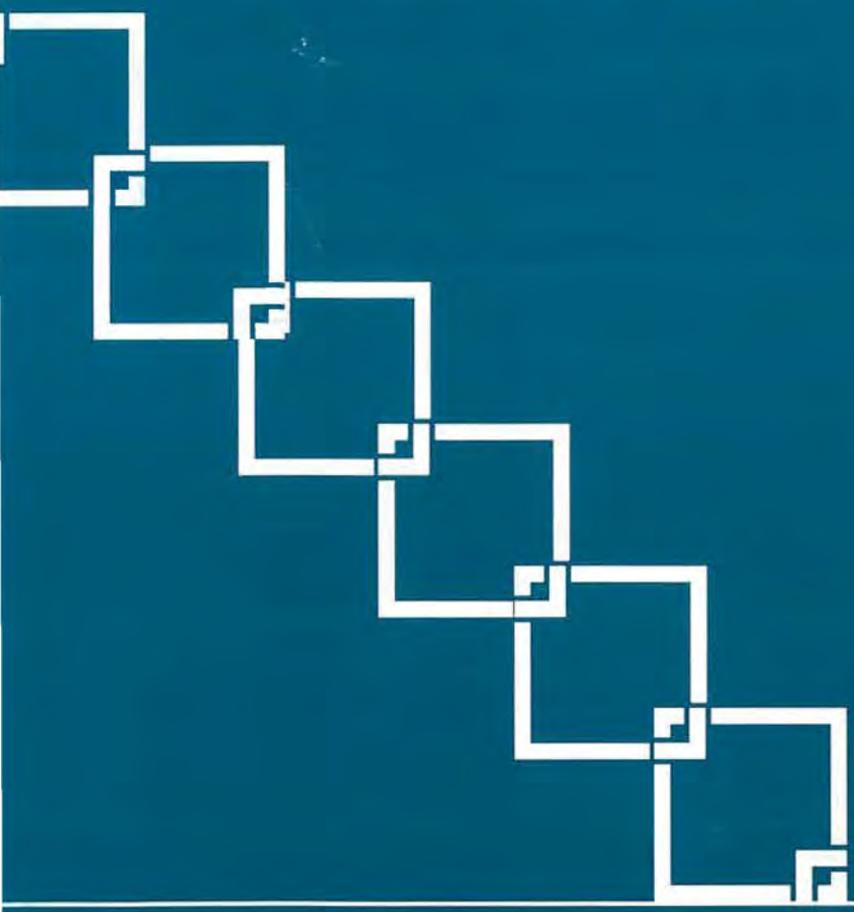
In the next phase of this project, a laboratory setup will be developed whereby coverage coefficient values can be calculated without the use of lasers or scanning. By doing this, it is hoped that many third-party laboratories that evaluate optical, impact, and other eyewear attributes for manufacturers would be able to perform these calculations also.

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