

Respirator Article Abstracts

"Half-Mask Respirator Selection for a Mixed Worker Group," Sandy F. Gross and Sanford W. Horstman, *Applied Occupational and Environmental Hygiene Journal*, April, 1990, pp. 229-235.

Air-purifying, half-mask respirators are appropriate for an increasing number of work atmospheres. Due to the great number of human facial variations, no one respirator facepiece will fit all workers. This situation is complicated further by the fact that most masks are designed for males. A major problem confronting industry is the growing proportion of women requiring respirators who cannot obtain satisfactory fits.

This project was designed to comparatively analyze the protection men and women are afforded by three brands (nine sizes) of commercially available half-mask respirators. Anthropometric (in this case, facial) measurements and quantitative protection factors were obtained from 61 male and 60 female civilian workers.

The quantitative fit-test results showed that 4.9% of men and 5% of women did not receive an adequate fit factor when tested with two randomly chosen brands of the three selected brands of half-mask respirators. No statistically different values were found by testing the men's fit as a function of the brand of respirator. Fit for women, however, was found to be dependent on the brand type. The range of percent acceptable fit by brand was 72-89 percent for women and 83-85 percent for men. The adequate fit data were then analyzed to determine what sizes of masks were most appropriate for men and for women. Men were found to wear 60-70 percent mediums and 30-40 percent larges for two brands. The third brand showed 12% of the men wore small, 44% wore medium, and 44% wore large. Only the small (49-75%) and medium (25-51%) of all three brands were found to fit women.

"Identification of Faceseal Leak Sites on a Half-Mask Respirator," Riedar K. Oestenstad, Jimmy L. Perkins, and Vernon E. Rose, *American Industrial Hygiene Association Journal*, May, 1990, pp. 280-284.

A method has been developed to identify the location and shape of respirator faceseal leak sites by the deposition of a fluorescent tracer. An aerosol generation, conditioning, and exposure system to provide a test environment with stable aerosol concentration and size distribution of 4-methyl-7-diethylamino-coumarin was designed and tested. Faceseal leak sites on a respirator mounted on a mannequin and worn by human subjects were identified by deposition of the tracer aerosol and subsequent observation under long-wave ultraviolet lighting. Test parameters were identified for the optimal definition of leaks. Photographic techniques were developed to document the identified leak sites.

"Distribution of Faceseal Leak Sites on a Half-Mask Respirator, and Their Association with Facial Dimensions" by Riedar K. Oestenstad, H. Kenneth Dillion, and Laura L. Perkins, *American Industrial Hygiene Association Journal*, May, 1990, pp. 285-290.

Faceseal leaks on one brand of half-mask respirator worn by 73 human subjects were identified by deposition of a fluorescent tracer aerosol during a standard quantitative fit test. The identified leaks were categorized according to their location and shape. It was found that about 89% of all observed leaks occurred at the nose or chin or were multiple leaks that included these sites. Fit factors for these types of leaks were significantly lower than for other types of leaks. About 73% of all leaks approximated the shape of a slit rather than a round orifice, and the prevalence of these leaks was affected by gender. Significant association of facial dimensions and leak sites were found. Most of these were attributed to differences in gender, and only a very small percentage were for the facial dimensions used to define the Los Alamos respirator test panel. Significant correlation of facial dimensions and fit factor were found for only three facial dimensions; none of which were used to define the test panel. Evidence of airflow streamlining within the facepiece was observed on 22% of the subjects. Results of this study indicate that respirator leakage is strongly affected by nose and chin leaks, that gender is a factor in how a respirator fits and that consideration should be given to including nasal dimensions when defining a respirator test panel and selecting a respirator for an individual wearer.