
Respirator Article Abstracts

We review the articles published in the American Industrial Hygiene Association Journal (AIHJ) and the Applied Occupational and Environmental Hygiene Journal for information that is applicable to the field of respiratory protection, and we publish the abstracts of these articles. We appreciate the cooperation of the American Industrial Hygiene Association and the American Conference of Governmental Hygienists in allowing us to do this.—Ed.

"Effect of Workload and Respirator Wear on Postural Stability, Heart Rate, and Perceived Exertion," by R. Seliga, A. Bhattacharya, P. Succop, R. Wickstrom, D. Smith, K. Willeke, *American Industrial Hygiene Association Journal* October, 52(10): 417–422, 1991

The effects on postural stability (sway) were investigated for different workloads under conditions of wearing a **full-facepiece** respirator and not wearing any respiratory protection device. Fifteen subjects accomplished light (40 W), moderate (85 W), and heavy (125 W) workloads under the two conditions. Measurements of postural sway were made immediately after each load by using a multicomponent, strain gauge-type force platform. Changes in each subject's movement pattern of the center of pressure were quantified and compared to their initial baseline sway tests. Each subject's heart rate and perceived exertion were also recorded during each condition. A statistically significant effect ($p = 0.007$) caused by workload was observed for total length of sway with or without a respirator. An interaction approaching statistical significance ($p = 0.056$) between workload and respirator use was found. This indicated that sway increased more quickly and in a more consistently linear fashion with increasing workload under the respirator condition ($p = 0.02$) compared to the nonrespirator condition. The results from the respirator condition showed linear increases in postural sway length across the entire range of workloads, but sway length in the nonrespirator condition showed an increase only at **125-W** workloads. The greater increase in sway during the postural balance test could be attributable to the increasing workload-induced proprioceptive fatigue effect on the nervous system's ability to process signals from proprioception systems **incongruent** with body sway. The heart rate was significantly higher during respirator wear (an increase in heart rate averaging 5.62 **beats/minute**). However, correlations between heart rate and sway length were significant ($r = 0.87$, $p = 0.0001$) only at the 125-W workload for the respirator condition. The implication of this study is that maintenance of optimal physiological workloads with or without respirators is an important ergonomics criterion in fall prevention.

"Measurement of 3-D Facial Contours for the Design of Half-Face Respirators," by K.G. Yatapanage, K. Post, *American Industrial Hygiene Association Journal*, January, 53(1): 19-26, 1992

A portable **anthropometric** test rig capable of obtaining three-dimensional face-shape data was developed and used to obtain information relating to facial shape, stiffness, and variance for a selected subgroup of respirator users in the Australian work force. A respirator seal shape most suited to the sample population was obtained by studying the central portion of the face of all the subjects. The optimum seal shape was established by following the path of minimum variance among all the faces; the method provided information on the shape, dimensions, and stiffness of the optimum seal for a respirator suited to the sample population. The seal surface flexibility required for a comfortable fit was determined by measuring the deflection of the skin caused by an applied pressure and using this information along with face shape-variance data. Results indicated that the required flexibility in the seal surface increased toward the lower portion of the face.