

Evaluation of a Proposed Method to Measure Penetration of Submicrometer Aerosols Through N95 Filters

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ABSTRACT

This study evaluated the reliability of a proposed method of measuring the penetration of submicrometer aerosols through N95 filter media. Test subjects wore elastomeric half facepieces sealed to their faces to minimize face seal leakage. Ambient aerosol QNFT (Quantitative Fit Tests) were performed with P100 and N95 filters without disturbing the facepiece. Since some penetration of submicrometer aerosols is expected with N95 media, the latter was a total penetration measurement. Penetration of the ambient aerosol through the N95 filters was then measured on a fixture. The measured filter penetration was subtracted from total penetration for the N95 QNFT. The remaining penetration was assumed to be face seal leakage and was used to calculate a corrected fit factor for each subject. Mean corrected N95 fit factors were significantly different than the P100 fit factors. In addition, there was essentially no correlation between corrected N95 fit factors and P100 fit factors. Additional filter penetration measurements were made on two brands of N95 filtering facepiece respirators using both the proposed method and human breathing. Mean penetration values measured on people differed from the proposed method by 1.7% to 63.3%. It was concluded that the proposed penetration measurement method should not be used to assess respirator performance.