

**POF034: General Platform presentation**

**Factors Affecting Filter Penetration and Quality Factor of  
Particulate Respirators**

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**Abstract**

In the present study, a theoretical model was used to examine factors affecting the filtration characteristics of filters used for respiratory protection. This work was designed to support the particulate filter test requirements established in 1996. The major operating parameters examined in this work include face velocity, fiber diameter, packing density, filter thickness, and fiber charge density. Characteristics of the most penetrating particle size were also modeled with the same operating parameters.

The results showed that aerosol penetration through electret filter media increases with increasing face velocity and increasing fiber diameter, and decreases as packing density, filter thickness or fiber charge density increase. Face velocity and fiber charge density have more significant effects on filter quality than the other factors. Filter quality increases with decreasing face velocity or increasing fiber charge density. For electret filters, (1) the most penetrating particle size increases with increasing fiber diameter; (2) an increase in packing density, thickness, or fiber charge density would cause the most penetrating particle size to decrease, and (3) the most penetrating particle size through electret filters increases with increasing face velocity and decreasing filter thickness. On the other hand, for non-electret filter media, the most penetrating particle size increases with decreasing face velocity, and the filter quality factor is not affected by filter thickness.