

**Nanoparticle Filtration Test Correlations with the TSI Nanoparticle Surface Area Monitor  
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Instantaneous filter penetration test conditions usually designate a face velocity, a characteristic aerosol size statistic and a method of aerosol detection. Correlations between filter tests may be done comparing test data by successively increasing layers of a filter medium. This usually results in a power curve correlation with the exponent equaling the ratio of the single fiber efficiencies from each test apparatus.

Filtration tests were done comparing particle count penetration in the diameter range of 10 to 300 nm on fiberglass flat filters using a TSI 8160 Automated Filter Test, a scanning mobility sizer (SMPS) filter test and the NSAM. Comparisons were done for monodisperse and polydisperse aerosols. It was found that the characteristic particle statistic for the NSAM penetration response was the area geometric mean diameter (AGMD), not the count geometric mean diameter (CGMD). The difference between the CGMD and the AGMD is dependent on the geometric standard deviation, and, therefore, NSAM penetration results incorrectly stated at a CGMD would be increasingly greater as the aerosol polydispersity increases.

Another finding for monodisperse nanoparticle challenges was that increasing the number of layers of filter paper does not necessarily result in a linear reduction of the log of the penetration fraction as the challenge particle size is decreased. This reduction becomes more and more non-linear as the size is reduced below 70 nm. Perhaps this is an artifact of the test technique, but it also occurs using the SMPS filter test.