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DESIGN OF A USER SERVICEABLE PHOTOMETER

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ABSTRACT

Light scattering photometers are widely used for testing the efficiency or penetration of air filters, including respirator filters. The signal from a photometer is a voltage that is proportional to particle concentration. In the TSI models 8130 and 8127 Automated Filter Testers, particle penetration through a filter is determined by dividing the downstream voltage by the upstream voltage. For high efficiency filters to have the most accurate penetration and efficiency measurements it is necessary for the photometers to have low background levels. However, through normal usage, the photometers accumulate particles on internal surfaces thus increasing the background level until which at some point the photometer must be returned to TSI for cleaning and service.

This paper describes a new, user-serviceable photometer for the TSI models 8130 and 8127 Automated Filter Testers. This new photometer can now be serviced by customers in the field, which minimizes filter tester down-time and reduces cost of ownership. Details of the photometer design and test results will be presented.

KEYWORDS

Photometer, Air Filter Testing, Light Scatter, Filter Efficiency

G12-2

INTERLABORATORY COMPARISON TO EVALUATE THE METHODOLOGY FOR DETERMINATION OF THE MEDIA FILTRATION EFFICIENCY AGAINST NANOPARTICLES

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ABSTRACT

Current international standards dealing with efficiency test for filters and filter media focus on measurement of the minimum efficiency at the most penetrating particle size. The available knowledge and instruments provide a solid base for development of test methods to determine the effectiveness of filtration media against airborne nanoparticles down to single-digit nanometer range.

An interlaboratory evaluation is performed in the framework of the European Mandate M/461 activities, within the Technical Committee 195 of European Committee for Standardization (CEN/TC195). The purpose is to develop a methodology to determine effectiveness of filtration media against air-borne particles in the 3 – 500 nm range.

Five different laboratories (Camfil, ETH/Empa, Politecnico di Torino, University of Minnesota, Unifil) participate in the round robin test in order to verify the repeatability and reproducibility of the test method. The qualification of test rig and apparatus is performed prior of the filtration efficiency and air flow resistance measurement tests.

Twilled dutch weave wire mesh was chosen to perform the filtration efficiency tests so as to ensure high uniformity of the samples being tested by each different laboratory. Some preliminary results are presented in the figure below. The filtration efficiency results of three laboratories are in accordance with each other, which may be an indication that there is a good repeatability and reproducibility.

Upon the completion of the round robin tests a statistical analysis under ISO 5725-2, will be performed in order to evaluate the accuracy of the methodology.

KEYWORDS

Filtration Performance, Nanofiltration, Filter Media, Filter Test, Standard Methods, Test Rig