S1.6.3 - *Automated Respiratory Filter Testing on the Production Line*

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Filtration products need to be tested in order to assess the correct protection level against harmful airborne particulate. It is important that the equipment that is used for testing the filtration products gives consistent results. For respiratory filter testing commonly used standards are 42 CFR part 84, EN 143/149, and GB2626. These standards define key parameters for testing such as flow rate, count median diameter, geometric standard deviation, aerosol concentration, and the measurement technology to be used to measure the particle concentrations upstream and downstream of the filter under test. The highest efficiency respirators are often elastomeric masks with cartridge filters that are either threaded or mounted onto the mask with a bayonet type connection. These filters are made on automated production lines and to assure that each filter meets the high efficiency needed for this type of filter they are 100% tested. To achieve this high level of testing the filter efficiency testing is often incorporated into the automated production system and is fully computer controlled, eliminating the manual operation of the test equipment. Testing speed is a critical aspect of this type of automated system since the testing can be a limit on the production output and the number of test instruments depends on how fast the tests can be

performed.In designing a tester for in-line production testing the aerosol path of the filter tester needs to be re-evaluated, as such changes could affect the particle size distribution. A detailed test matrix was executed in order to obtain continuity of measurement results between this new model and the model 8130A that is commonly used for certification. Because testing speed is critical in automated operation it is also necessary to optimize the tester to perform testing at the fastest possible timing and still assure that the test results are consistent. In this presentation we will discuss how performance is affected when increasing the speed of testing. We will also show data from use of the new tester in a simulated production line and discuss the correlation of test results with the equipment used for certification.In conclusion, these tests showed an excellent agreement between testers operated manually that are used for certification as well as quality control to the new tester specifically designed for automated operation.

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Tim Johnson has a Bachelor's degree in Physics from Macalester College in St. Paul Minnesota. He has worked at TSI Incorporated for over 42 years and has worked with the Automated Filter Tester products since 1990. He is currently Senior Application Engineer in the Particle Instruments product group. He is responsible for training in particle instruments used in detecting, sizing and measuring concentrations of particles in the air. He has served on a number of product development teams developing instrumentation for counting and sizing airborne particles as well as automated filter testing equipment. He is responsible for the product applications using automated filter test equipment and components used in filter testing applications. He is a member of on the American Filtration and Separation Society (AFS). He is actively involved in the ASHRAE on the TC 2.4 committee. He is a member of ISO/TC142, expert on ISO/TC142/WG 3 (general ventilation filters) and is a co-convener of JWG11 (ISO/TC142 and IEC/TC59 – Portable air cleaners). He is a member of ASTM committees on Medical Face Masks and the new Barrier Face covering standard (F3502).

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