

Results of Round Robin Particulate Filtration Testing in Support of ISO TC94/SC15

Andrew Viner

3M Occupational Health and Environmental Safety Division, St. Paul, Minnesota, USA

In the course of development of proposed test methods for ISO TC 94 / SC 15, several questions arose regarding test criteria for particulate filter penetration tests. While consensus was achieved regarding the materials to be used for testing (NaCl and paraffin oil), questions generally pertained to the ability to achieve the specified particle size distributions and resulting filter penetrations among different test laboratories. Separate round robin studies were undertaken with NaCl and paraffin oil aerosols to address some of these questions. The NaCl round robin was conducted between 3M's laboratory in St. Paul, MN and the Technology Institution of Industrial Safety (TIIS) laboratory in Sayama City, Saitama, Japan. At 3M a TSI Model 8130 Automated Filter Tester (AFT) was used for testing whereas at TIIS a Sibata Model 9000 tester was used. Both labs used a TSI Model 3936 SMPS to measure the size distributions of the test aerosols. Flat samples of three different filter materials were used for NaCl testing: a fiberglass material, 3M Filtrete™ web, and an electrostatically charged blown microfiber web manufactured by 3M. Initial penetrations measured at 3M and TIIS generally agreed with each other, although there were some discrepancies. For one web (Filtrete™) the results for the two locations diverged substantially as the filters were loaded with NaCl. Testing with paraffin oil was conducted at 3M, TIIS, DEKRA EXAM (Essen, DE) and IFA (Sankt Augustin, DE). For this study both 3M and TIIS used TSI Model 3120 AFTs capable of operating at flows of 180 L/min whereas DEKRA EXAM used a Lorenz FMP 03 Filter Test System and IFA used a modified EN 143 test rig. Initial results showed a wide discrepancy between 3M and TIIS. Several factors were found to contribute to the discrepancy, the most important of which was the aerosol generator. Subsequent testing with a single aerosol generator yielded good agreement between all four test locations.