

Efficiency of Particulate Respirator Filters under High Flow Conditions

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Particulate respirator filters are certified by the National Institute for Occupational Safety and Health (NIOSH) at a constant flow rate of 85 L/min using salt and oil test aerosols having a mass median diameter (MMD) of approximately 0.3 μm . However, measurements of physiological parameters of workers show peak inhalation flow rates for short durations can exceed 400 L/min for certain activities that demand high work loads. This study investigated the effects of high volumetric and peak flow rates on the filtration efficiency of NIOSH-approved P100 and N95 particulate respirator filters. Four cyclic flow conditions with peak flows up to 430 L/min and three constant flow rates (up to 360 L/min) were evaluated. The test challenges consisted of solid and oil aerosols having nominal MMDs ranging from 0.02 to 3.0 μm , spanning the spectrum of potential particulate aerosols generated in traditional industrial workplace settings. As expected, aerosol penetration was found to increase under increased cyclic and constant flow conditions. The magnitude of the increase was dependent on the specific filter type and design. The Assigned Protection Factor (APF) of the respirator must be considered when determining the significance of the increase.