

PORTACOUNT[®] RESPIRATOR FIT TESTER THEORY OF OPERATION

APPLICATION NOTE ITI-048

The PORTACOUNT[®] Plus fit tester measures the particle concentration inside and outside the respirator and calculates a fit factor, the ratio of the two measurements. As with any aerosol based quantitative fit testing technique, the respirator must be equipped with high efficiency filters. Since few particles penetrate a high efficiency filter, any found inside the respirator can be attributed to face seal leakage.

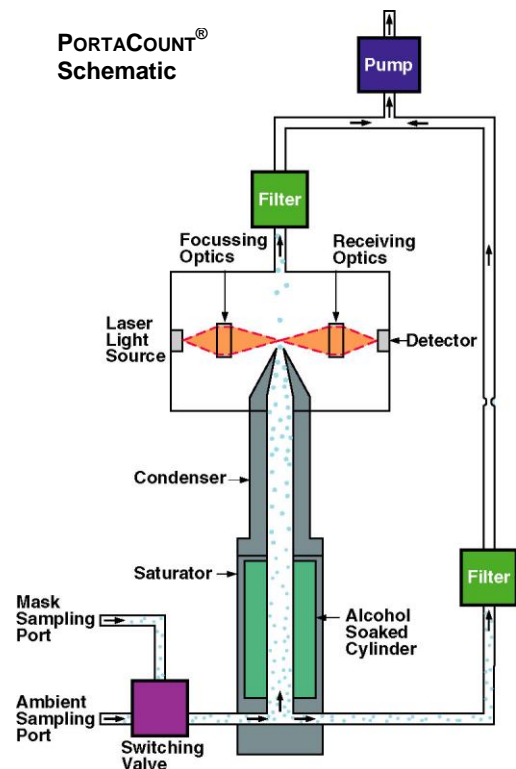
Particles entering the PORTACOUNT Plus pass through a saturator tube where they are combined with alcohol vapor. They then pass into a condenser tube where alcohol condenses on them, causing each to grow into a larger droplet. The droplets then pass through a focused laser beam, producing flashes of light which are sensed by a photo-detector. The particle concentration is determined by counting the light flashes.

This unique single particle counting capability differentiates the PORTACOUNT Plus from all other fit testing techniques or instrumentation. The PORTACOUNT Plus detects lower concentrations of particles, up to several orders of magnitude lower, than other methods. Thus, it will operate with ambient aerosol, eliminating the need for high concentrations of aerosol generated in a tent or chamber.

The concept of using a condensation nucleus counter (CNC) for the purpose of quantitative respirator fit testing was first demonstrated in 1981 by Dr. Klaus Willeke of the University of Cincinnati.

Reference:

Willeke, K., H.E. Ayer, J.D. Blanchard. "New Methods For Quantitative Respirator Fit Testing With Aerosols". *American Industrial Hygiene Association Journal*, Feb. (1981).





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