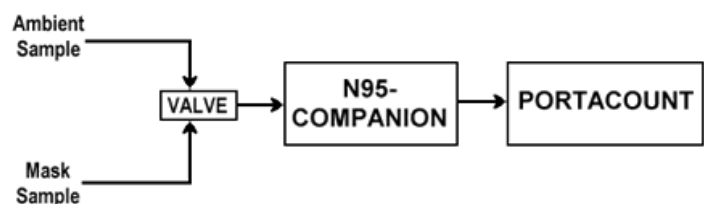


N95-Companion™ Model 8095 Theory of Operation

Application Note ITI-053

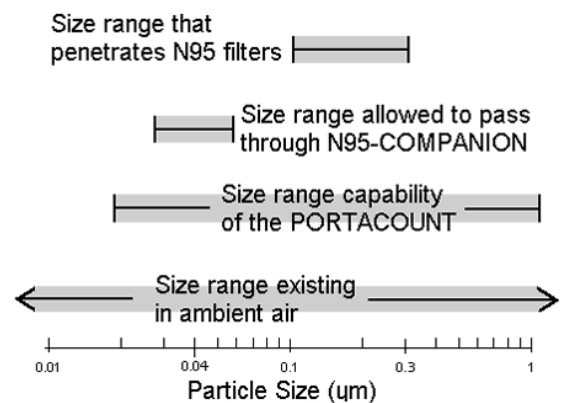
The N95-Companion™ Model 8095 is an accessory for the PORTACOUNT® Plus Model 8020 Quantitative Respirator Fit Tester. In the most simple terms, it is an aerosol pre-conditioner that selects particles in a specific size range and passes them on to the PORTACOUNT® fit



tester. Particles that are not in the target size range are discarded. Without the N95-Companion™ mask fit tester, the discarded particles could be incorrectly counted as face seal leakage, because many of them are in the size range that can penetrate an N95 filter.¹

With the N95-Companion™ mask fit tester connected, the PORTACOUNT® fit tester "sees" only particles that are in the right size range for effective quantitative fit testing.

Aerosol-based quantitative respirator fit testing relies on the assumption that all particles detected inside the mask got there through a face seal leak. When the respirator being fit tested is equipped with high efficiency filters such as HEPA, N100, R100, P100, N99, R99 or P99, this assumption is valid because virtually all particles are trapped.² They cannot enter the mask through the filter.



¹There is a common misconception that fiber-type filters behave like a sieve, trapping large particles and allowing small ones to pass. This could not be further from the truth! If you are not familiar with the way fibrous filters trap particles, please refer to Applications Note ITI-041 Mechanisms of Filtration for High Efficiency Fibrous Filters.

²When ambient air is used as the challenge aerosol, N99, R99, P99, N100, R100 and P100 filters can safely be assumed to trap all particles. The N95-Companion is not needed.

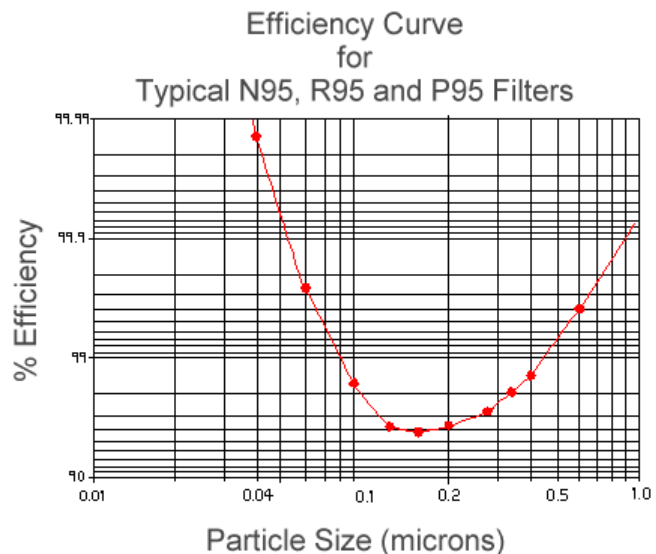


When the respirator is equipped with lower efficiency filters such as N95, R95 or P95, the assumption that all particles detected inside the mask got there through a face seal leak is no longer valid. Up to 5% of the particles may penetrate through the filter. Unless taken into account, the particles that slip through the filter will be interpreted as face seal leakage and a lower than deserved fit factor will result. This conservative fit factor will often be below the required pass/fail level (typically 100). In some cases (using a PORTACOUNT® fit tester by itself), the fit test would fail even if you glued an N95 mask onto the person's face!

The N95-Companion allows the PORTACOUNT® Plus fit tester to fit test N95, R95 and P95 respirators by restricting the size range of the particles counted by the PORTACOUNT® fit tester thereby eliminating particles in the size range that can penetrate through the respirator filter and be counted incorrectly as face seal leakage. Since the remaining particles cannot get through a class 95 filter, the assumption that all particles detected in the mask got there through a face seal leak is valid again!

An unavoidable consequence of eliminating all unwanted particles is that many desirable particles are also eliminated. This results in far fewer particles being available for fit testing than there would be if the N95-Companion™ were not attached. To compensate for this, the Model 8026 Particle Generator is provided as a standard accessory with the N95-Companion™ mask fit tester. Even so, the low particle concentrations restrict the system to a maximum fit factor of 200.

Since the only difference between fit testing with the PORTACOUNT® fit tester alone versus the PORTACOUNT® fit tester/N95-Companion™ mask fit tester together is the particle size of the aerosol, it is reasonable to wonder if particle size affects the result of the fit factor measurement. Over the years, a number of studies have been conducted that address this question. Most of the research shows that particles greater than about 2 microns in diameter have difficulty penetrating face seal leaks. Unfortunately, these studies for the most part neglected to examine the behavior of particles below a few tenths of a micron, which is the range used by the PORTACOUNT® fit tester and the N95-Companion™ mask fit tester. To address this void in the research, TSI conducted a study using particles in the size range from 0.02 to 1.0 micron. The results show that all particles in the range used by the PORTACOUNT® fit tester and N95-Companion™ mask fit tester are in fact appropriate for respirator fit testing. Please refer to [Application Note ITI-055 Penetration of Ambient Aerosols Through Respirator Faceseal Leaks](#).



N95-Companion is patented under US Patent No. 6,125,845.

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Contact your local TSI Distributor or visit our website www.tsi.com for more detailed specifications.