

Particle Size Selective Systems for Filter Efficiency Tests

Model #7.xxx

Standard

Filter separation efficiency is based on dust load storage, particle size, pressure differential in relation dust load and recovery time is the filter is back flashed.

Depending on the filter and application many different standards exist, such as the HEPA filter standard Fed. Std. 209F or the material filter test EN 1822 or the mask filter test 143 and 149. Many industrial specific tests exists such as the automobile filter test ISO 5011 or the ISO 8373 for compressed air quality, or vacuum cleaner filter , as EN 60312 or the ventilation filter test in accordance to ASHREA 52.2 etc

GRIMM has therefore developed size selective particle analyzers, able to count each single particle and measure the respective size. This instruments permit therefore proper measurement upstream the test filter and than down-stream the same filter. The relation is the filter efficiency by particle size as percentage of efficiency.



Two spectrometers; on the top two S.S. isokinetic samplers; in front the temperature and relative humidity sensor and the pressure differential sensor; in the background the connected laptop



#7.309 GRIMM Aerosol Spectrometer

#7.309 The GRIMM Aerosol Spectrometer

The #7.309 GRIMM Aerosol Spectrometer can measure very high particle concentrations up to 2,000,000 particles/liter but also each single particle between 0.3 to 10 microns and his size leaving the filter. The #7.309 can express the size distribution in 12 different size channels and is therefore better than in many of the above mentioned standards requested.

The sample is taken via our isokinetic sampler out from the ventilation dust and enters the above mentioned spectrometer. The results obtained are stored on a data logger card, or can be directly transferred to an attached computer (so the counts and size distribution can be seen) . This method is done sequentially (1st downstream and than upstream the filter) so that our GRIMM software can build automatically the efficiency curve in percent.

Wind speed, the air temperature and the pressure trop between the test filter can be measure simultaneously with our system, so that the sampling conditions can be recorded as well.

A reproducible Aerosol Generator is needed additionally upstream the test filter. We recommend our well proven generator #7.811 or #7.822. More details see in page "standard generators"

Continuous Field Monitoring such as in existing ventilation systems can also be made with this system. We hereby recommend the use of two spectrometers, so that the filter efficiency at different wind and dust loads can be measured. We therefore have a special software for simultaneous measurement in the wind tunnel/ventilation duct. GRIMM offers several different kinds of instruments.

More details about Aerosol Generators see under our page "Generators"

Model	Size range (μm)	Dust range ($\mu\text{m}/\text{m}^3$)	Size channels	Applications
#7.309 "Filtercheck" -fine-	0.27 ... >2.0 Sample air: 2.0 l/min	Particle counting up to 2,000,000 P/l	-12 channels in P/l in μm : 0.27/0.3/0.35/0.4/0.45/0.5/ 0.6/0.7/0.8/0.9/1.0/1.6/>2.0	Filtertests acc. ASHRAE
#7.310 "Filtercheck" -coarse-	0.7 ... >50.0 Sample air: 1.2 l/min	1 ... >150,000	-12 channels in $\mu\text{g}/\text{m}^3$ and in P/l in μm : 0.7/1/2/3/5/ 7.5/10/12.5/20/30/40/50	Filtertest for coarse particles

Portable Units

■ #7.200 Flame Photometer

This system (16 kg) is designed to be portable and operates with a sodium flame detector in accordance to EN 149. It can handle small depth filters/masks.

■ #7.309 Aerosol Spectrometer

This small portable system (only 2.5 kg) is described above and measures counts and size concentration. Results are expressed as:

- particle counts/liter or the
- dust concentration in $\mu\text{g}/\text{m}^3$
- wind velocity (in m/sec)
- filter pressure differential (in pas)
- temperature and relative humidity

■ #7.300 Ventilation Filter Tester

As #7.309 but as dual system. Complete 15 kg (32 lbs), works with 2x #7.309 Spectrometers, each measuring independently the aerosols. Sensors for wind speed, relative humidity, temperature and one pressure differential reader are included. Via our powerful software program we show in real time the graphical and/or numerical values 10x per minute such as:

- particle counts in front of and behind the filter efficiency in % or the Penetration in %
- dust load up- & downstream ($\mu\text{g}/\text{m}^3$)
- filter recovery and clean up time.
- pressure differential in Pascal
- temperature ($^{\circ}\text{C}$) and humidity in %
- air speed (meter/second)

Custom made system are also available, such as for automobile filter, oil filter, etc... (details on request).

Stationary Systems

■ #7.100 Respiratory Filter Bench

This is a complete bench rig system (75 kg) and designed for mask testing and other filter applications in accordance to EN 143. The internal generator uses NaCl (salt) and can be supplied with one (or two) flame-photometers. Connections for a filter tester and/or mask holder are standard. An optional data acquisition box can convert the results directly into filter efficiency % or penetration.

■ #7.600 HEPA/ULPA Production Tester

This large production system detects automatically in accordance to EN 1822 on complete HEPA and ULPA filters the efficiency over the complete filter, identifies possible (pin) holes in the filter and/or frame and marks clearly this point(s), so a repair of the damage can be made manually. This system operates with several laser particle counters or CNC units at the same time to speed up the measuring process.

■ #7.700 Flat Filter Sample Tester

This system is designed in accordance to EN 1822, to test samples up to 283 mm diameter. The complete test stand is 54 kg (110 lbs) and detects automatically the most penetrating point of high efficiency filters. Equipped with an aerosol generator, one or two particle counters (or CNC), different climatic sensors and an automatic computer controlled system, it is a quick and efficient research or QC tool. The picture on the right top shows a complete #7.700 system.

■ # 7.800 Aerosol Generators

We offer a range of different portable or stationary dust generating systems. Most units can be connected with our detectors, so a complete system, depending on the application, can be customized by us.