

Why Aerosol Generators?

For a lot of applications test aerosols are needed, which should be reproducibly generated with a stable and adjustable particle concentration and a defined particle size distribution. Some typical applications of such test aerosols are described in the following.

Filter Testing

Product quality assurance and safety aspects require regular tests of high-efficiency filters, certification of laminar air flow boxes and clean room measurements in general. For this purpose a suitable test aerosol is needed because atmospheric aerosols or ambient air tend to vary quickly in concentration and distribution as well. According to the VDI-guideline 3491 it is suggested to use aerosol generators to produce test aerosols in a definite manner. With aerosol generators producing highly concentrated aerosols, whose mean particle size is close to the most penetrating particle size (MPPS), leak locations can more easily be found in a short time. Using an oily aerosol material (DEHS, DOP, Emery 3004) provides stable aerosol during the measurements with known living time (long term evaporation).



ATM 225 and ATM 220 Aerosol Generators

Aerosol Research

Atomizer aerosol generators are used in various fields of aerosol science, for example for

- Inhalation studies
- Toxicology experiments
- Environment characterisation

Calibration of Measuring Instruments

Dispersing of PSL reference materials for instrument calibration (particle sizers, optical particle counter, photometer) should also be mentioned as typical aerosol generator application.



ATM 220 Aerosol Generator with Diffusion Dryer Suitable for Generation of Calibration Aerosols

Stream Visualisation

Last but not least atomizer aerosol generators are used for stream visualisation. Here the user wants to seed particles of known size and material to the measuring zone to be able to measure afterwards velocity and their profile by means of optical methods.

Standard Generators ATM 220 and ATM 225

This aerosol generators are especially designed for challenging filters in clean rooms or laminar air flow boxes. Compact and robust design characterise this models of the series ATM. The generators facilitates atomizing various oily liquids, e.g. DEHS, DOP, Emery 3004 and salt solutions.



ATM 225 Aerosol Generator with Open Hood

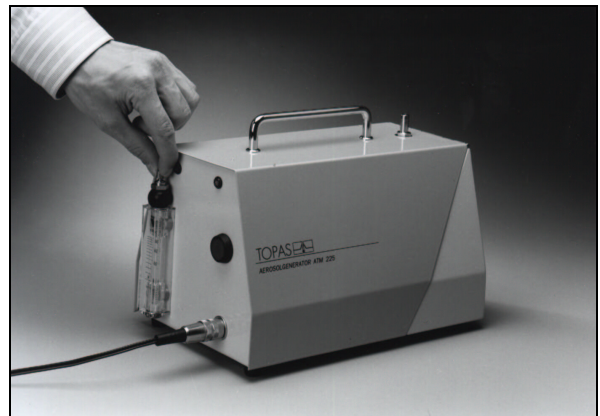
Operation Principle

The essential part of this aerosol generator is a new atomizer made completely of stainless steel (pat. pend. GS 9408604). It works as a two-stream nozzle based on the injection principle and is combined with a baffle placed close to the spray outlet. This integrated particle impaction section removes coarse spray droplets and results in a number dependant particle size distribution mainly below $1\mu\text{m}$.

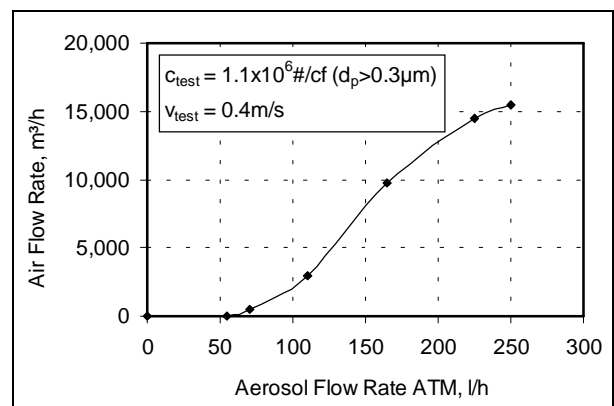
The figure on the right shows particle size distribution of a DEHS-aerosol, as measured by a scanning mobility particle sizer system in the size range $0.15\mu\text{m}$ to $1\mu\text{m}$. Although the maximum count concentration of $5 \cdot 10^{11}$ particles/cf can be stated for $0.2\mu\text{m}$, $3 \cdot 10^{10}$ particles/cf has been experimentally found for sizes larger than $1\mu\text{m}$.

Features

The ATM 220 is designed for use with an external pressurised air supply. At the ATM 225 the required air stream is produced by an built-in air compressor. Power is supplied by a 12VDC adapter which is compliant with safety requirements. The instruments featuring a smooth surface to permit easy cleaning. Their size and weight of these instruments allows mobile use. The flow rate of the generator ATM 225/E can be easily adjusted by means of a needle valve, enabling precise control of the particle production rate during operation.



ATM 225/E Aerosol Generator with adjustable Particle Production Rate



Aerosol Flow Rates Needed to Check Filter Classes EU13 and EU14 (ATM 220 and ATM 225/E)

High Particle Production Rates with ATM 230 and ATM 240



ATM 230 Aerosol Generator

Features

The ATM 230 works similar to the principle of the ATM 220, but its design allows a 10times higher particle production rate.

The main application of this atomizer aerosol generator is challenging the integrity of large filter areas. The generated particle size distribution has been found to be close to that of the smaller generators. Particles bigger than $1\mu\text{m}$ are removed by a baffle plate.

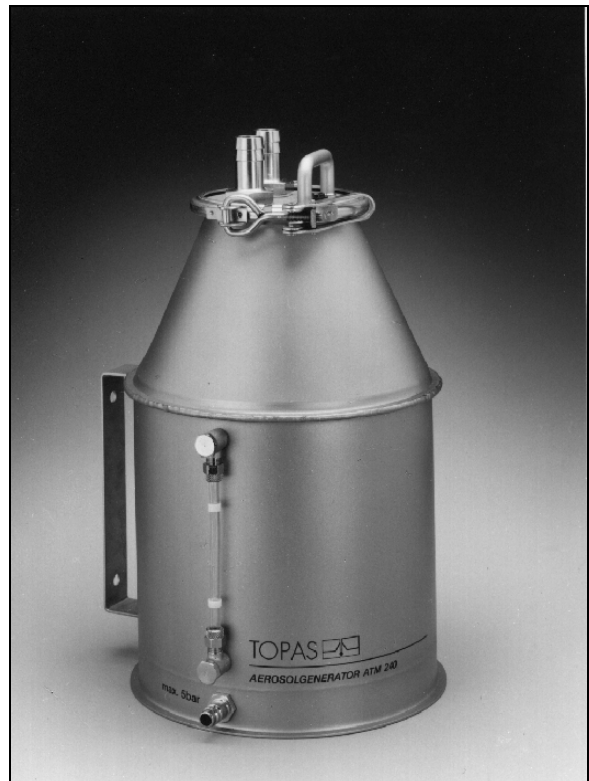
The highest aerosol production rate can be realised with the ATM 240. This generator is especially suitable for generating tracer particles and seeding large wind tunnels.

The aerosol flow rates of both generators are adjustable by setting the nozzle operation pressure. Their big liquid reservoir enables long term operation. Both generators feature very robust design and they are easy to operate and to clean as well.

A New Nozzle Type...

has been developed for the ATM 240 (patent announced). Compressed air is blown through a $100\mu\text{m}$ thin ring slit into the liquid to be nebulized. Shear forces acting between air jet and the liquid at the circumference of this so-called ring slit nozzle form the droplet aerosol. Big droplets are prevented from leaving the liquid through inertial effects.

More than 15 hours non stop operating time is warranted by the huge liquid reservoir of the ATM240. The used materials are resistant against corrosive liquids. The user can easily check the liquid level at the indicator outside the generator.



ATM 240 Aerosol Generator

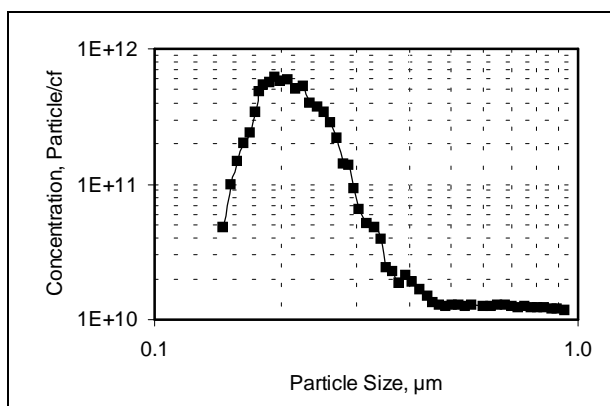
Specifications

Atomizer Aerosol Generators ATM 220 / 225/E

Pressurised air supply	Max. 800kPa (8bar) (ATM 220)
Flow rate	50 ... 250l/h
Mass flow	Max. 2.5 g/h
Counter pressure	Max. 10kPa (100mbar)
Outlet	Ø 8mm
Aerosol Materials	DEHS, DOP, Emery 3004, paraffines, Latex-spheres (max 2µm), suspensions, salt solutions
Power supply	12VDC (ATM 225)
Nonstop operation	25h (80ml liquid)
Production rate	$5 \cdot 10^{12}$... $25 \cdot 10^{12}$ particles/h

Aerosol Specification for DEHS

Total concentration	$>10^{11}$ particles/cf
at 0.2µm	$5 \cdot 10^{11}$ particles/cf
at 0.5µm	$1 \cdot 10^{10}$ particles/cf
at 1µm	$3 \cdot 10^9$ particles/cf
Range 0.3 - 0.5µm	$4 \cdot 10^{11}$ particles/cf
Range 0.5 - 1.0µm	$2 \cdot 10^{11}$ particles/cf
Modal particle size (count distribution)	0.25 µm



Number Concentration Distribution of a DEHS Aerosol Produced (ATM 220 / 225)

Atomizer Aerosol Generator ATM 230

Pressurised air supply	Max. 800kPa (8bar)
Flow rate	1 ... 2.5m³/h
Mass flow	Max. 25 g/h
Counter pressure	Max. 30kPa (300mbar)
Outlet	Ø 19mm
Aerosol Materials	DEHS, DOP, Emery 3004, paraffines, Latex-spheres (max 2µm), suspensions, salt solutions

Atomizer Aerosol Generator ATM 240

Pressurised air supply	Max. 500kPa (5bar)
Flow rate	4 ... 10m³/h
Mass flow	Max. 80 g/h
Counter pressure	Max. 1kPa (10mbar)
Outlet	2 × Ø 19mm
Aerosol Materials	DEHS, DOP, Emery 3004, paraffines, suspensions, salt solutions

The DEHS aerosol number concentration and particle size distribution produced by the ATM 230 and ATM 240 has been experimentally found to be similar to that generated by the ATM220/225.

Look also at our World Wide Web site at <http://www.granuloshop.com/vitrine/>

Specifications are subject to change without notice.

