

Invention Report: Hybrid High-Performance Separator "MiniMax"

At the Institute of Mechanical Process Engineering, a novel, high-performance droplet separator has been developed as part of a research project. The new separator enables the efficient separation of aerosol droplets with diameters $d \ll 1\mu m$, with a low pressure drop $\Delta p < 1000 Pa$, making it highly energy-efficient. The separation of the dispersed phase is achieved through a unique flow guidance of the aerosol-laden stream within the small-scale separator, as well as by the close coupling of the force effect in the centrifugal field with separation at fabric-based micro-impactors. Application areas for this small-scale and compact separator include fuel cell systems, vacuum and compressor technology, the chemical and petrochemical industries, as well as environmental technology and indoor air applications.

Properties of the innovative liquid aerosol separator:

- High-performance and energy efficiency: Compared to the classic co-current cyclone, the cut-off particle diameter x_{50} is reduced by 40% at the same pressure drop, or the energy consumption is reduced by 50% for the same separated aerosol size fraction.
- Compact design: Due to its novel flow guidance and integrated construction, the separator requires minimal space, making it especially suitable for mobile applications.
- Durability and low maintenance: The separator has a service life of several years.
- Simple design: The simple construction allows for cost-effective injection molding for series production.
- Intellectual property rights: Patent application filed with the DPMA on April 15, 2024.

For further information or inquiries regarding licensing or further cooperation, please feel free to contact us.



Figure: left: the novel separator; right: a paperclip for illustrating the dimensions of the separator.