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Unrivaled Filter Performance: ep Dualfilter T.I.P.S.® Show Highest Filter Efficiency Across Compared Filter Pipette Tip Market

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Abstract

The formation of aerosols during pipetting is a main source of contamination, leading to false and non-reproducible results. Filter pipette tips are designed to capture such aerosols, preventing the contamination of the pipette cone lumen by these airborne particles from the sample. Therefore, the efficiency of the filter inside the filter pipette tip is crucial for safeguarding both the pipette and the sample. This study evaluates the filter efficiency of 13 different pipette filter tips.

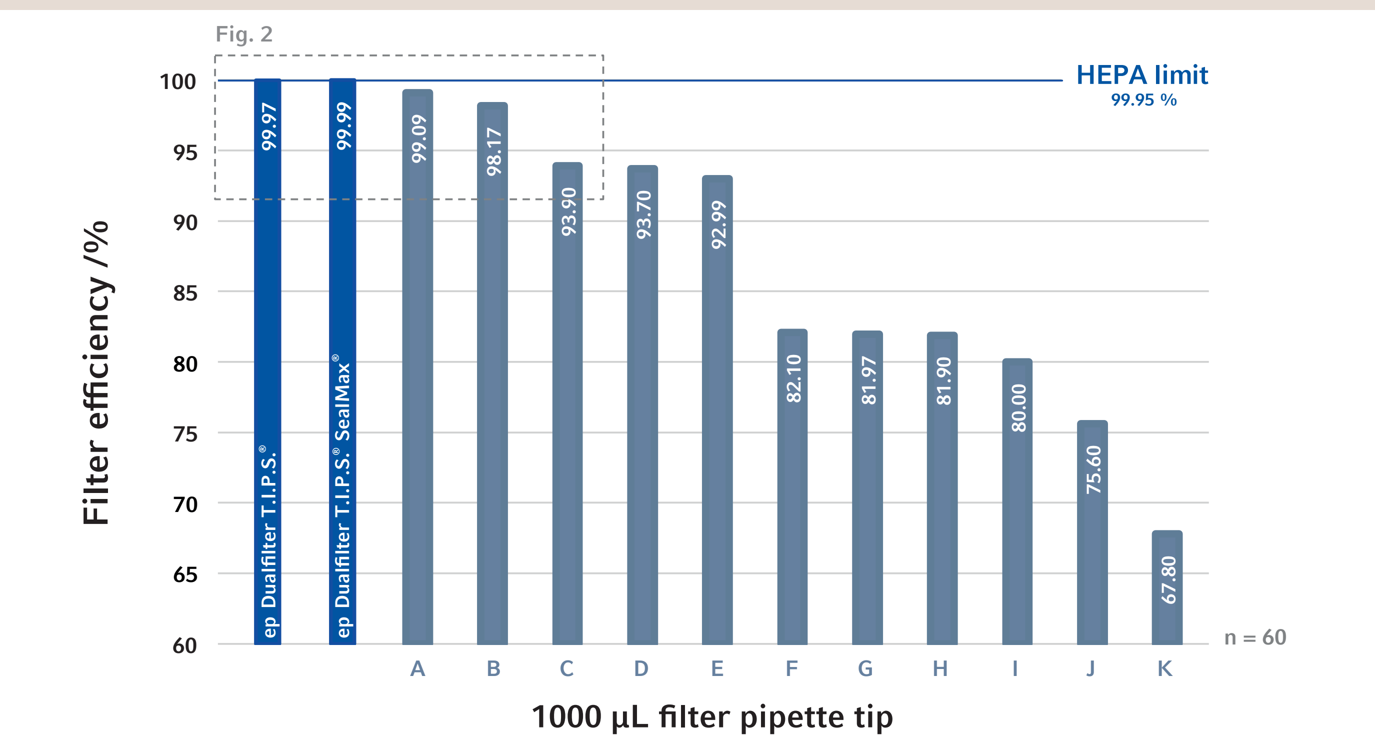

Table 1: Filter efficiency of 1000 µL filter pipette tips. The lower the efficiency, the more aerosol particles pass the filter. The displayed filter efficiency describes the average efficiency of each filter at its MPPS, n = 60. The blue line indicates an efficiency of 99.95 %, that is defined as a HEPA-filter by BS EN 1822-1:2019 [2]. Only ep Dualfilter T.I.P.S.® and ep Dualfilter T.I.P.S.® SealMax® reach this HEPA limit.

Results

The filter efficiency of 13 different filter pipette tips was measured following ISO 29463-5 guidance [1]. We observed that only Eppendorf ep Dualfilter T.I.P.S. and ep Dualfilter T.I.P.S. SealMax reached a filter efficiency level of >99.9 % (Figure 1). This would refer to a HEPA class filter (high efficiency particle air filter) following BS EN 1822-1:2019 [2].

None of the other tested filter pipette tips reached the HEPA level. In fact, no other tested pipette filter tip even reached the lower EPA filter class level (efficient particle air filter of 99.5 % efficiency, Figure 2).

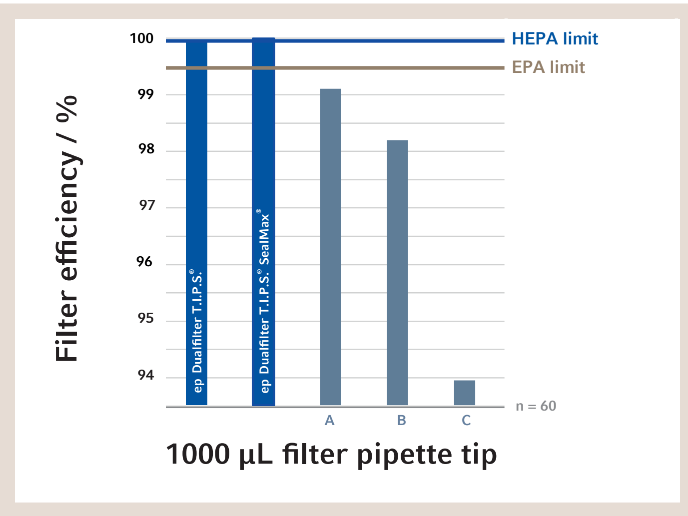

Figure 2: Filter efficiency of the five most efficient filter pipette tips tested (Figure 1). The lower the efficiency, the more aerosol particles pass the filter. The displayed filter efficiency is an average of sixty filter tips tested as technical replicates (n = 60). The blue line indicates an efficiency of 99.95 %, the brown line an efficiency of 99.5 %, that is defined as a HEPA-filter and EPA-filter, respectively, by BS EN 1822-1:2019 [2]. Only ep Dualfilter T.I.P.S.® and ep Dualfilter T.I.P.S.® SealMax® reach HEPA and EPA levels.

Methods

The measurements followed ISO 29463-5:2018 [1] guidance. A polydisperse Di-Ethyl-Hexyl-Sebacat (DEHS) aerosol was passed through each 1000 µL filter pipette tip at a flow rate of 0.06 L min^{-1}. The penetrating aerosol particles were quantified using a scanning mobility particle sizer, and the ratio of this value to the reference blank determined the permeability per particle size. The most penetrating particle size (MPPS) was identified at the minimum point of the resulting curve. Throughout the measurements, temperature, humidity, and ambient pressure were maintained at constant levels.

All tested filter pipette tips were from one lot per manufacturer, had a volume of 1000 µL, except for those from manufacturer I, which only provided 1250 µL filter tips. The ep Dualfilter T.I.P.S. SealMax, as well as the filter tips from Manufacturer A and D, are self-sealing and incorporate a liquid-retention feature within the aerosol filter. All filter tips were stored in accordance with product specifications until the time of measurement and were tested within their expiry dates.

References:
[1]: ISO 29463-5:2022 High-efficiency filters and filter media for removing particles in air - Part 5: Test method for filter elements. www.iso.org
[2]: BS EN 1822-1:2019 High efficiency air filters (EPA, HEPA and ULPA) – Part 1: Classification, performance testing, marking. https://www.en-standard.eu/

Ordering information

Description	Order no. international
ep Dualfilter T.I.P.S.®, PCR clean/sterile 1000 µL	0030 078 578
ep Dualfilter T.I.P.S.® SealMax®, PCR clean/sterile 1000 µL	0030 078 748

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