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# **PUBLICATION**

TECHNICAL PAPER

## **FILTER SELECTION FOR SAFETY CABINETS**

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Modern safety cabinets can reliably achieve an aperture retention efficiency of >99.999% (tested according to the KI Discus method - see Esco technical article on the topic). This refers to the percentage of particles (released at the weakest point inside the cabinet) that are retained in the air barrier and do not escape to the laboratory.

The protection of a safety cabinet depends on both the retention efficiency of the air barrier and the efficiency of the filters - both of these being routes through which contaminants can escape.

Clearly, then, modern HEPA filters, which are usually rated at 99.99% efficient against particles 0.3 micron in size, are ineffective relative to the retention efficiency of the front air barrier. To put this in simple terms, on a conventional cabinet meeting the retention efficiency requirements, and having a filter rated at 99.99% - out of 100,000 particles - 1 would escape from the front aperture whereas 10 would escape through the exhaust filter (this is a gross simplification, but it does illustrate the point).

It is due to the realization of this principle that all Esco safety cabinets are equipped with filters rated with a minimum efficiency of 99.9991% at the most penetrating particle size, in order to exceed the retention efficiency of the front aperture.

This is the optimum balance between safety and economy. Equipping the cabinet with a filter at an even higher efficiency would serve little purpose and would only add unnecessary cost to the user, since the overall effectiveness of the cabinet would still be limited by the retention efficiency of the front aperture.

Some manufacturers offer, as an alternative to conventional HEPA filters, a choice of ULPA (ultra low air penetration) filters that perform at higher efficiencies. ULPA filters typically operate at an efficiency of 99.999% at 0.12 microns.

#### **Efficiency ratings of ULPA filters used in Esco Airstream biosafety cabinets**

Minimum efficiency at 0.12 microns:	99.9994%	
Typical efficiency at 0.12 microns:	99.9999%	
Minimum efficiency at 0.3 microns:	99.9995%	
Typical efficiency at 0.3 microns:	99.9999%	(competing brands - 99.99% at 0.3 microns)
Minimum efficiency at MPPS: (MPPS - most penetrating particle size)	99.9991 %	
Typical efficiency at MPPS :	99.9999%	