Cartridge filters: A glossary of terms

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While not suitable for some applications, a cartridge dust collector offers real solutions for many dust control problems. The reason is the dust-capturing efficiency of the collector's cartridge filters. This glossary of terms covers some cartridge filter basics.

Compared with a baghouse, a cartridge dust collector can handle much more airflow, requires less space, and is easier to maintain. Why? The collector's cartridge filters provide much more media surface area in a more compact package than bag filters. This allows the cartridge dust collector to handle more airflow without requiring frequent filter changeouts.

The following definitions explain cartridge filter construction and performance terms. [***Editor's note:*** Find more information about cartridge dust collectors elsewhere in this issue and in articles listed under "Dust collection and dust control" in *Powder and Bulk Engineering*'s comprehensive "Index to articles," December 1994, pages 83-84.]

Cartridge filter construction

Media: This material separates the dust from the airstream. The dense, nonwoven material is often cellulose or synthetic; the latter is made of polymer or other man-made fibers. The media is pleated and shaped into a long cylinder.

Liner: This perforated or expanded metal cylinder is located inside the pleated media to help hold its cylindrical shape. The liner also gives the cartridge filter longitudinal rigidity. Sometimes an outer liner or a series of bands encircles the media to prevent blowouts during pulse cleaning.

Endcaps: These caps hold together the ends of the cartridge filter (liner and media). A hole in the top endcap allows filtered air to exit the filter and allows the cleaning air pulse to enter in the reverse-flow direction.

Potting compound: This material attaches the media to the endcaps and prevents unfiltered air from passing around the media rather than through it.

Gasket: These soft polymer or rubber rings form an airtight seal between the cartridge filter and the dust collector's tube sheet.

Cartridge filter performance

Air-to-media ratio: Also known as *filtration velocity,* this defines the air volume capacity of the cartridge dust collector. The collector's air volume capacity is determined by multiplying the appropriate air-to-media ratio by the collector's total media surface area. Correctly sizing a cartridge dust collector requires knowing the appropriate air-to-media ratio for the specific process dust (typically available from the cartridge filter manufacturer).

Efficiency: Filter efficiency measures how much dust the cartridge filter removes and is typically expressed as a percent of incoming dust removed.

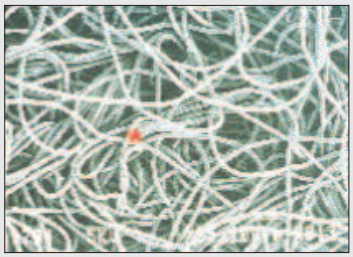
Permeability: Filter permeability measures how much air can pass through the clean cartridge filter at a given pressure drop. A high-permeability filter is advantageous because it produces a low pressure drop across the filter and reduces the energy required to run the dust collector.

In choosing a cartridge filter, efficiency must be balanced with permeability. For a media fiber of a given diameter, the only way to increase the filter's efficiency is to pack more fibers into the media, which in turn reduces its permeability. Figure 1 shows two media: one with moderate efficiency and permeability (Figure 1a), the other with higher efficiency but lower permeability (Figure 1b). Reducing the diameter of the media fibers is the only way to increase efficiency without increasing permeability. **PBE**

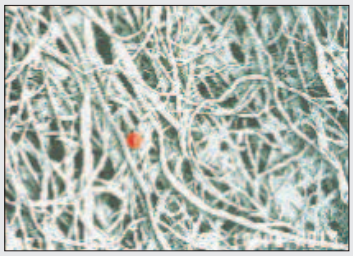
Figure 1

Cartridge filter media with different efficiency and permeability[a]

a. Moderate-efficiency, moderate-permeability media



b. Higher efficiency, lower permeability media



[a]*Note:* Media photographed with a scanning electon microscope; the red dot represents a 50-micron particle

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