FILTER MEDIA · COALESCING & PARTICULATE ELEMENTS

Why borosilicate glass microfibre?

How R+F coalescing and particulate filter elements capture oil aerosols, water droplets and fine particles – and why the efficiency of every R+F microfibre grade is stated at 0.01 µm.

FILTER MEDIA	CAPTURE RANGE	EFFICIENCY RATING	MEDIA BEHAVIOUR
Borosilicate glass microfibre	**> 50 µm down to < 0.01 µm**	**Grade-specific @ 0.01 µm**	**Non-absorbent, hydrophobic**

THE MATERIAL

Borosilicate glass microfibre media remove oil aerosols and liquid droplets across a very wide size range – from well above 50 µm to below 0.01 µm – at high efficiency.

The fibres neither absorb nor adsorb liquid. They keep their original structure in service, so the element maintains its efficiency at a low pressure drop instead of swelling or loading up like absorbent media. This is why R+F uses borosilicate glass microfibre for all coalescing (RF-C, RF-CS), particulate (RF-P) and disposable in-line (RF-DIF) elements.

HOW PARTICLES ARE CAPTURED – FOUR MECHANISMS

Gravitational settling typ. 20–50 µm
At low velocity inside the element, large droplets fall out of the gas stream. Their downward motion through the media makes contact with a fibre more likely.

Inertial impaction > 1 µm
Heavier aerosols cannot follow the gas around a fibre; their momentum carries them straight into it (path A).

Direct interception 0.3–1 µm
Particles follow the streamlines but pass a fibre within half their own diameter and are held (path B).

Diffusion (Brownian motion) < 0.3 µm
Very small particles move randomly, independent of the gas flow. The smaller they are, the more they move – and the more likely they hit a fibre (path C).

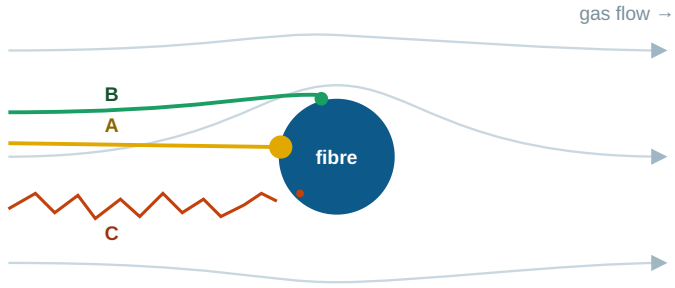

Fig. 1 – Capture on a single fibre: A inertial impaction, B direct interception, C diffusion.

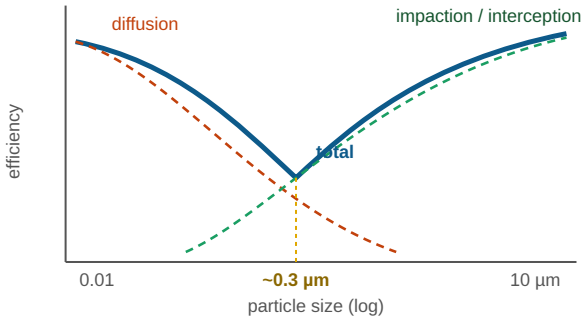

Fig. 2 – Qualitative efficiency curve. Diffusion rises as particles get smaller, impaction/interception as they get larger; the most penetrating size lies around 0.3 µm.

FROM CAPTURED AEROSOL TO DRAINED LIQUID – COALESCENCE

Captured aerosols must leave the system. On the fibres, small droplets merge (coalesce) into larger drops. These drops become heavy enough to migrate through the media to the bottom of the element and into the filter bowl, where a manual or automatic drain discharges them.

Coalescence depends on operating conditions: pressure, temperature, gas velocity, humidity and the properties of the liquid (density, viscosity, surface tension). Media type, element size and configuration must therefore match the application – which is why we size every filter on your actual operating data.

Glass microfibres are hydrophobic: captured water forms droplets rather than a film, which keeps the efficiency stable.

WHY “PORE SIZE” IS NOT A MEANINGFUL RATING

A particle is retained when it touches a fibre; intermolecular (Van der Waals) forces hold it there, largely independent of its composition, humidity or temperature. The exact size or shape of the spaces between fibres is not decisive. Depth-media microfibre elements are therefore rated by **efficiency at a defined particle size**, not by pore size. Standard tests for high-efficiency media (DOP and sodium-flame) deliberately use the hardest-to-capture range of about 0.3–0.6 µm.

R+F EFFICIENCY GRADES

Grade	Efficiency	Typical role
AX	**99.99998 % @ 0.01 µm**	Ultra-fine final stage
UX	**99.9999 % @ 0.01 µm**	High-purity final stage
HE	**99.99 % @ 0.01 µm**	Standard final coalescing
ME	**99.5 % @ 0.01 µm**	Intermediate stage
ST	**95 % @ 0.01 µm**	Pre-coalescing, long life
PF	**90 % @ 0.01 µm**	Pre-filtration, lowest Δp

BINDERS & TEMPERATURES

Type	Binder	Element max. temp.
standard	Acrylic	**−50 to +150 °C**
K	PVDF	**150 °C**
S / CS	Silica (inorganic)	**up to 500 °C**

- The housing limit always applies: aluminium 120 °C, stainless steel 200 °C (seal-dependent).
- Outer diameter of 51×230 / 51×476 elements: coalescing RF-C / RF-CS 62.5 ± 1.5 mm, particulate RF-P 58 ± 1.5 mm.
- Microfibre coalescing elements are not cleanable. Replace them at the recommended differential pressure or service interval; where a coalescing element is used instead of a sintered PTFE element, replace it every 3 months.

Need the right grade for your gas?

Send us gas, flow, pressure, temperature and contamination – we return a configuration with R+F article numbers.

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