

Improving the performance of coalescing filters

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Abstract

In many industrial sectors fibrous filters are used to remove undesirable liquid aerosol particles from gas streams with applications in dehumidification, automobile filters; and exhaust filters. Small improvements in the performance of the coalescing filters can lead to significant economic impact.

The performance of coalescing filters can be improved by adding nanofibers as well as drainage channels in the filter media structures. Nylon nanofibers of about 150 nm are added in micro-glass fibers of 2 to 5 micron size for different area ratios. It was observed that the relative quality factor increases rapidly for small area ratios, it passes through a maximum for area ratio of about 1.0, and gradually declines for larger area ratios. The experimental results indicate that the optimum relative quality factor occurs for 0.1 grams of nylon nanofibers added to 2.0 grams of glass fibers, or about 5 % nanofibers by mass.

Drainage channels and fiber orientation can enhance filter performance by providing pathways for the liquid to drain from the media. Our experimental results show oriented with the direction of gravity helps in removing drainage of liquid from the filter medium and reduces pressure drop which is in accordance with filtration theory.

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