



Nanofiber Air Filter

Technology Overview

Increasing filter performance in heating, ventilation, and air conditioning (HVAC) air-handling units is recommended by the Centers for Disease Control and Prevention (CDC) as a way of improving workplace safety in response to airborne pathogens such as COVID-19. These high-capacity HVAC filters use nanofiber media to increase filtration effectiveness while simultaneously improving energy efficiency by lowering airflow restriction. They combine a small-diameter¹ nanofiber nonwoven fabric with a large-diameter fibrous filter medium to form a structure with small interstitial spaces that can capture sub-micron particles down to .1 μm in size. The high surface area of the nanofibers can capture 9 to 15 times more particles than a traditional filter with the same minimum efficiency reporting value (MERV) rating. Large pores in the filter medium lower pressure drop and allow unobstructed airflow over long periods of time, thereby increasing filter life.

Why is GSA Interested?

Following COVID-19-related guidance from the CDC, GSA is running HVAC equipment longer, increasing outdoor air ventilation, and installing MERV-13 filters, whenever feasible, in all GSA-operated buildings. Previous studies have shown that switching from a MERV-8 to a MERV-13 filter can increase fan energy use by 11% to 18%.² And in some cases, HVAC equipment cannot accommodate a MERV-13 filter because of increased pressure drop and reduced airflow. Nanofiber filters can help GSA meet CDC indoor-air guidelines while conserving fan energy and reducing maintenance costs.

How Will Success Be Measured?

The testbed design will assess four key manufacturer claims: 9x increased filtration; up to 16% fan energy savings; 2x longer-lasting filters; and payback of less than 1 year.

The filters will be compared side-by-side with commercial off-the-shelf filters under different operating conditions, including environments with high dust volume, pollen, humidity, and wildfire smoke.

Deployment Potential

This technology has broad deployment potential across GSA's real-estate portfolio. The filters have MERV ratings from 11 to 15, the same form factor as commercial off-the-shelf filters, and should function as drop-in replacements.

¹1,000 times smaller than a human hair

²Zaatari, Marwa & Novoselac, Atila & Siegel, Jeffrey. (2014). The relationship between filter pressure drop, indoor air quality, and energy consumption in rooftop HVAC units. *Building and Environment*. 73. 151–161. 10.1016

Green Proving Ground (GPG), in association with a Department of Energy national laboratory, is evaluating the real-world performance of Nanofiber Air Filters in federally owned buildings within GSA's inventory. The technology will be provided by eSpin (Chattanooga, TN) and coordinated with other ongoing evaluations of this technology.