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MERV-13 FILTRATION IS THE BEST-KEPT SECRET FOR NYC BOYS & GIRLS HIGH SCHOOL

ENEREF INSTITUTE EXAMINES HOW MERV-13 FILTRATION
PROTECTS STUDENTS' HEALTH IN NYC SCHOOLS

New York City was the first major school system in the United States to authorize the use of MERV-13 filtration in through-the-wall window air conditioners to slow the spread of SARS-CoV-2.

MERV-13 filters have been shown to reduce students' risk of viral transmission and protect students from contracting the SARS-CoV-2 virus because the filter is significantly more efficient at capturing the virus

“I GET TREMENDOUS SATISFACTION KNOWING I HAD A PART IN PUTTING A FILTER IN A CLASSROOM THAT DOES VIRUS FILTRATION.”

HOWARD BLADY | *Klearview Appliance*

than more commonly used air conditioning filters.

Boys and Girls High School in Brooklyn, one of 1,859 New York City public schools, was an early adopter of MERV-13 filtration for their numerous window air conditioning units. The NYC public school district is the largest in the United States, with over one million students.

MERV-13 FILTRATION IS THE SCHOOL'S BEST-KEPT SECRET AGAINST COVID

The school building's filtration upgrade has not been well-publicized and is the Education Department's best-kept secret in their fight against Covid-19.

“I know about the filters because I'm friends with the custodian, but I don't know if everyone else knows,” said Ieisha Borden, Secretary to the Principal of Boys and Girls High School. “It would make them feel like I feel—a little bit safer.”

The air conditioning units act as a filtration system to capture virus particles throughout the year by continually re-filtering and circulating conditioned air regardless of temperature demand.

Lavonne Gaston, Parent Coordinator at Boys and Girls High School, noted, “We talk about the cleaning and all those things with parents, but I think sometimes we don't go into the air conditioning and those types of details with them.”

While the improved HVAC filtration system reduces exposure to airborne pathogens, the more robust filters also increase resistance to airflow inside the air conditioners, which increases energy demand. To mitigate the filters' increased energy use (and carbon footprint), Boys and Girls High School employs rooftop solar panels. Pratt Institute estimates the solar panels—which generate over 500 kW of electricity—reduce the school's annual

carbon emissions by 182Mg CO₂.

Still, in fan-only mode, the energy demand is negligible. “You can put it on fan mode to [capture the virus] and it'll cost you a fraction of the money in energy. You're only spinning the fan motor and you have MERV-13 filtration,” explained Howard Blady, owner of Klearview Appliance. The New York City Department of Education (NYCDOE) purchased the MERV-13 filters from Klearview Appliance.

THE EARLY DECISIONS THAT INFLUENCED ACTION

In August 2021, John T. Shea, the Chief Executive Officer for Division of School Facilities (DSF), directed custodian engineers to install MERV-13 as replacements for existing air conditioner filters. Custodial staff, who regularly maintain the school district's entire HVAC system, replaced the filters at 30-day intervals. To assure against any leakage, the filters were installed using filter clips provided by Shea's department. Four months later in December 2021, the New York State Education Department sent out its own directive from the Office of Facilities Planning, recommending “high efficiency MERV-13 air filters as a proven and safe method for removing pathogens and other



MERV-13 AIR CONDITIONER

Boys and Girls High School window air conditioners are five times more effective at capturing airborne respiratory viruses than typical air conditioners.

contaminants with the HVAC system.” Funds for the filters were authorized by American Rescue Plan (ARP) education funds.

THE ADVANTAGES OF AMERICAN-BASED MANUFACTURING

All of the window air conditioning units installed in the Boys and Girls High School were manufactured by Friedrich Air Conditioning Co., a 140-year-old American company. Early in the Covid-19 pandemic, Friedrich recognized that their standard window and

through-the-wall air conditioner lines were already built with the necessary headroom to expand their filtration from a MERV-6 to a virus-removing MERV-13.

Almost all window air conditioners sold in the US are now manufactured in Asia. In order to fit a greater number of air conditioners onto shipping containers, Asian-manufactured units are built necessarily small, leaving little room for a more robust filter.

“You’ve got to get the packing boxes to a certain size because you don’t want to fit two-and-a-half boxes across your shipping

container. You want to fit that third box,” explained Howard Blady of Klearview Appliance. “That’s not a concern for Friedrich. They just pack them on trailer-trucks,” he said. “That’s why their product makes sense.”

A further obstacle for Asian-based manufacturers is that the cost of shipping has increased significantly during the pandemic. Although the Friedrich filters are proprietary and need to be replaced regularly, today they are still the only major window air conditioning units that house a MERV-13 filter.

PERFORMANCE TECHNOLOGY

Early in the pandemic, the New York City Department of Education purchased air purifiers, budgeting for two purifiers per classroom. However, it was later determined that the air purifiers were insufficient at reducing viral exposure because they refreshed the classroom's air only twice per hour. A study by Dr. Brent Stephens, who leads the Illinois Institute of Technology's Built Environment Research Group, found that each purifier was only able to turn 129 cubic feet of air per minute (CFM). The window

air conditioners, on the other hand, turn 640 CFM according to Friedrich's engineering department. Furthermore, the cost for the MERV-13 filters in the air conditioner units was significantly less than in the purifiers.

In Boys and Girls High School, the MERV-13 filters capture airborne respiratory viruses and trap pollutants. Many existing HVAC systems were designed using MERV-8 filters or less, yet MERV-13 filters are five times more effective at capturing respiratory droplets and

reducing viral concentration. Asthma, too, is managed with better filtration because the condition is triggered by indoor exposure to allergenic irritants. Nearly one in thirteen school-age children suffer from asthma in the US.

VENTILATION AND FILTRATION

Outside air dilutes indoor airborne contaminants, which is why opening windows is recommended. However, the CDC suggests that while ventilation can reduce the risk

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ROOFTOP SOLAR PANELS

Robust filters increase energy demand, but the school employs solar energy to mitigate its carbon footprint.

of viral exposure, it will not eliminate risk. The Friedrich air conditioners in Boys and Girls High School are designed to allow some outside air to ventilate the classroom. At the same time, their MERV-13 filters limit the need for an overabundance of outdoor air, thereby lowering the costs of heating and cooling from temperature differentials.

BALANCING FILTER WITH SYSTEM PERFORMANCE

Both system performance and filter performance are considered in the design of a well-balanced air conditioner. A robust filter requires more air pressure, or power, to pull air through the filter. However, impeding the airflow can freeze up the system. Friedrich employs numerous technologies

to protect the coils from a restrictive air flow, including forward curved blowers, the performance of the compressor and heat exchangers, the overall design, and the shape of the filter itself to physically fit for optimal performance.

“My question to Friedrich was, if we put this filter in, will it cut the CFM of the amount of air that it’s gonna move. And they said that it’ll be fine,” said Klearview’s Howard Blady. “To me it means that the customer’s not gonna call and say my unit is freezing up... that it’s working.”

To guarantee there is no leakage around the filtration system, Friedrich utilizes a filter-holding mechanism with special gap fittings and notches that securely rest flush against the front coil.

“There’s one thing that you don’t want, it’s aggravation and unhappy customers, so you want to sell them a good product,” Blady said. “That’s a good product.”

HEALTHY INDOOR AIR IS NEEDED FOR A SAFE SCHOOL ENVIRONMENT

School Principal Grecian Harrison envisions Brooklyn’s Boys and Girls as a high school that helps students achieve success and embrace learning in a safe and supported environment. Healthy indoor air is part of that school’s safety program and should become standard, not just at Boys and Girls, but in commercial, industrial, and institutional buildings across the US.



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