RENSA FILTRATION

The Essential Guide to Data Center Air Filtration

How to Improve Uptime, Reduce Maintenance Costs, and Optimize HVAC Performance

The Hidden Costs of Inefficient Air Filtration

Your data center's performance hinges on one often-overlooked factor: **air quality**.

With cooling systems consuming as much as 50% of your facility's energy[i], even minor issues can escalate into costly failures. Yet, many data centers still rely on outdated filtration systems—leaving their mission-critical equipment vulnerable to dust buildup, overheating, and unplanned downtime.

And downtime is not an option.

> **Every second offline is a direct threat to your bottom line.**
> According to the Uptime Institute, over 60% of data center failures result in at least $100,000 in losses, while outages that cost more than $1 million are becoming increasingly common.[ii]

Despite these risks, many data center managers don't realize that their current air filters are silently eroding system performance—increasing their energy consumption, risk of equipment failures, and maintenance costs.

Why Air Filtration Matters More Than Ever

The need for advanced air filtration has never been greater.

Data center HVAC systems are pushed to their limits by:

Escalating computing demands

AI workloads, cloud computing, 5G networks, and cryptocurrency mining use enormous amounts of energy. According to the International Energy Agency (IEA), data centers could soon double their electricity consumption—a demand comparable to the energy usage of an entire nation.[iii]

Environmental threats

Dust and corrosive particulates can infiltrate server rooms, degrading hardware and increasing the risk of failure. In addition to airborne pollutants, factors like humidity, high temperatures, and salt exposure can put extra strain on cooling systems. Without proper air filtration, contaminants can accumulate on heat exchangers and cooling equipment, reducing efficiency and making it harder for your chillers, cooling towers or fresh air intakes to keep equipment at a safe operating temperature.

Rising operational costs

Poor air filtration forces your cooling systems to work harder, which drives up energy consumption and accelerates wear and tear on your critical infrastructure. With energy prices climbing, every inefficiency adds up.

Despite these challenges, many data center teams rely on outdated filtration systems. Air filters that don't perform can increase energy use, strain your cooling equipment, and cause hardware failures—all of which drive up costs and operational headaches.

A Smarter Approach to Air Filtration

This guide provides you with key considerations for choosing an air filtration system for your data center. You'll discover:

How to reduce your air filter replacement costs and HVAC maintenance effort by up to 50%.

The exact filters you need to combat humidity, odors, and environmental contaminants.

Why filter longevity and energy efficiency aren't trade-offs—you can have both!

By the end of this guide, you'll know how to optimize your data center's cooling and air filtration. Because when it comes to protecting your uptime, **clean air isn't a luxury—it's a necessity.**

5 Things to Consider
When Choosing an Air Filtration Solution for Your Data Center

Your data center operates in a high-stakes environment where even minor disruptions can lead to failures and downtime. You need an air filtration solution that's up to the task.

A well-designed, multi-stage filtration system captures fine particles to protect your equipment from the environmental hazards inside and outside your facility.

Here are five things to consider when selecting air filtration solutions for your data center:

1. Your data center's layout

The layout of your facility plays a key role in determining the accessibility and efficiency of your air filtration system.

If your air handling units (AHUs) and rooftop units (RTUs) are on your roof, consider how you will transport replacement filters. Carrying heavy or bulky filter skids from your loading dock to rooftop is time-consuming and labor-intensive. Opt for lightweight filters that come in multiples per box, so you don't need to make as many trips.

If your filters are at ground level, accessibility can still be a challenge. Some units may be in hard-to-reach areas, making changeouts difficult and time consuming. Filters with extended service lives and high dust-holding capacity can reduce your risks and replacement frequency.

A "bag-and-tag" service can also simplify your filter management. Look for an air filtration partner who will organize and tag your filter boxes so you can see, at a glance, where they go. They can label boxes for your AHU, RTU, fan room, or any other location or application accordingly, so your team can quickly identify filters and send them to the right location—saving time and reducing the risk of installation errors.

2. Your location

Your geographical location has a massive impact on your air filtration requirements. The wrong filters can leave your equipment vulnerable to humidity, moisture, temperature variations, static electricity, and corrosion. When unaddressed, these issues can threaten your data center's operations.

If your facility is in a dry region, dust can clog your filters, restrict airflow, and strain your HVAC system. The more dust in your area, the more frequently you must change your filters. Choose filters with a high dust-holding capacity to minimize changeouts.

Does your region get lots of rain, snow, or humidity? If so, your filters may collapse and block critical airflow through your equipment—causing unexpected downtime. You can reduce these risks with filters made with moisture and corrosion-resistant materials. They prevent water absorption to ensure continuous airflow to your critical equipment.

3. Your long-term total cost of ownership (TCO)

Many facilities choose the lowest-priced air filters they can find. But saving a few dollars upfront can lead to higher expenses in the long term.

Lower-quality filters degrade faster, requiring more frequent changeouts and maintenance. With data centers using anywhere from 500 to 24,000 air filters annually, maintenance can become overwhelming quickly.

If you're short-staffed, you might delay maintenance and changeouts, but this can lead to problems down the road. Old filters force HVAC fans to work harder, increasing your energy consumption and costs. Inefficient filters can also let in particles that damage your equipment.

Higher-quality filters may cost more initially, but they last longer and require fewer changeouts. Reducing replacements from twice to once per year can cut your air filter purchasing costs in half while lowering your labor and maintenance time by 50%.

A filtration partner can put you on a regular changeout schedule and take care of everything for you. That way, you can maximize airflow, extend your equipment's lifespan, and keep your energy costs in check—all while freeing up your team to focus on other critical tasks.

4. Your customization needs

Data centers aren't one-size-fits-all—and neither are air filtration solutions.
The right partner should customize your filters to meet your exact specifications and performance standards. Here's what to look for:

Application
Will your filters go in or on fresh air intakes, air handling units (AHUs), rooftop units (RTUs), cooling towers, or chillers? These systems have unique airflow requirements, and your partner should optimize your filters for your application to help boost efficiencies and protect your equipment.

Particle filtration efficiency
Choose a partner with filters that meet your desired MERV ratings or other efficiency metrics while ensuring compatibility with your HVAC system.

Filter dimensions
Standard filter sizes won't fit every data center's HVAC or duct system. If needed, ask if your partner can manufacture filters in custom sizes to ensure a proper fit and optimal performance.

Product media
Low-pressure drop media minimizes airflow resistance, allowing air to move more efficiently. This can help you extend filter life and reduce energy consumption, leading to significant cost savings. Also, look for media that doesn't shed fibers or particles, which could contaminate your downstream filters and equipment.

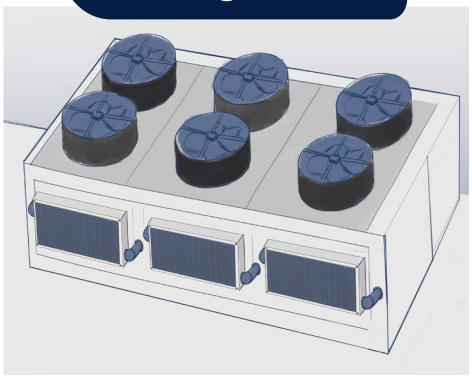
Dust-holding capacity
If your data center struggles with high particulate levels, your air filter partner should offer media that traps more dust before reaching its maximum pressure drop, extending filter life and reducing replacements.

5. Your sustainability strategy

Data centers have massive cooling demands and are under pressure to reduce energy and water consumption.

A mid-sized data center uses 300,000 gallons of water per day—the same amount used by 1,000 homes.[iv] But cooling strategies vary, and each requires the right air filter combo to optimize efficiency and minimize energy consumption.

Cooling Towers

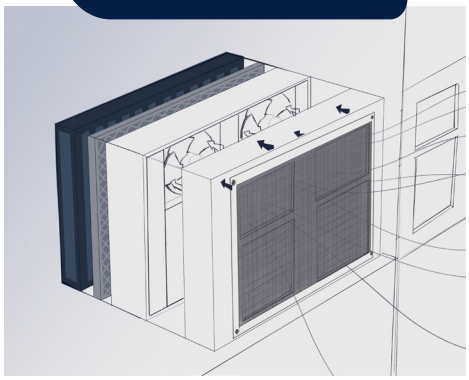


Water-based cooling (cooling towers)

If filters don't capture outdoor particles, contaminants can enter the water basin. Then, they will require more chemical treatments, strainer cleanings, and costly water changeouts.

This can increase operational costs, water consumption, and chemical waste.

Fresh Air Intakes

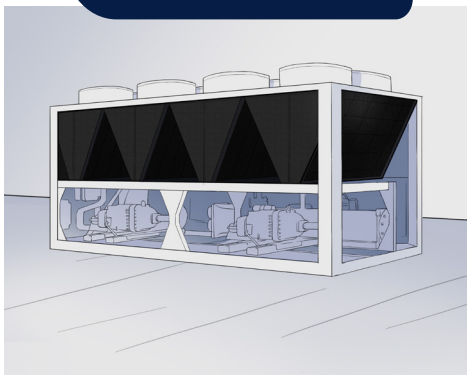


Fresh air cooling (outside louvers)

Systems that rely on fresh air intakes must filter out dust, debris, and corrosive particles to maintain consistent airflow.

Without proper filtration, build upon heat exchange surfaces can force fans and cooling equipment to work harder, which may lead to higher energy consumption and increased maintenance needs.

Chillers



Chiller-based cooling (condenser coils)

Airborne contaminants that accumulate on condenser coils can reduce heat exchange efficiency, make chillers work harder, and increase energy consumption.

Choosing Sustainable Air Filter

Each cooling strategy comes with unique challenges, but the right filters can help you achieve your sustainability goals.

Here are five things to look for when choosing sustainable air filters:

Long lifespans

The longer you keep your filters, the less garbage you produce. Look for filters with extended service lives to reduce waste while reducing your purchasing, change-out and disposal costs.

Filters with lower pressure drops

Lower pressure drops mean better airflow, allowing your air handling units to consume less energy while maintaining proper ventilation and cooling performance.

Washable filters

Washable air filters can be a game-changer for sustainability and cost savings. Instead of constantly buying new filters, you can clean and reuse **polypropylene** or **metal filters** multiple times—reducing your waste and costs.

Air filters made from recyclable or biodegradable materials

Some filter manufacturers offer recycling programs to help reduce landfill waste. Ask your supplier if they provide recyclable, incinerable, or biodegradable filters to support your sustainability efforts.

Filters that meet sustainability certifications

To ensure your air filtration choices align with your environmental goals, look for products that comply with industry sustainability standards, such as:

ASHRAE Building Decarbonization initiatives

ENERGY STAR® or similar energy efficiency labels

ISO 14001-certified manufacturers (Environmental Management System)

Reduce Your Operations and Energy Costs by 40% with Rensa's Air Filtration Solutions

When it comes to data center air filtration, not all suppliers are created equal. You need a partner who doesn't just sell filters but provides a complete, cost-effective solution tailored to your data center's needs.

At Rensa, we go beyond industry standards to set new benchmarks for performance and efficiency. Our custom-engineered air filtration solutions help you lower your total cost of ownership, trap more dust, improve airflow, and extend filter life—all while maintaining the highest air quality. From high-performance products to personalized service and fast shipping, here's why 16,000 customers trust Rensa for their air filtration needs.

Custom air filtration solutions

Rensa will work with you to build a custom filtration solution that meets your specifications. We can customize every aspect of your air filters—including their dimensions, media, and particle filtration efficiency.

A one-stop shop

With a catalog of over 42,000 air filtration products, we can get you what you need. Our high-performance offerings include pleated filters, mini-pleats, bags/pockets, carbon filters, washable filters, and more.

Rapid, reliable delivery

Our network of nationwide manufacturing plants produces over 12 million air filters yearly. We offer fast turnaround times and cost-effective shipping, so you get your filters quickly.

Premium service

Our owned and partner distributors can handle everything, including stocking, delivering, replacing, and disposing of your filters. We can also monitor your system's monthly performance and recommend optimal replacement times.

Recommended Air Filters for Data Centers

Your air filtration system shouldn't require compromises. With solutions from Rensa, you can achieve cost savings, energy efficiency, lower labor expenses, and better equipment performance—at the same time.

Here are some filter combinations that we recommend for data centers.

Filter longevity

To maximize filter lifespan and minimize changeouts, consider a multi-stage filtration system.

01. Air intake protection

The PreVent air intake filter and **PreVent EZ-Rail System®** capture large debris before they enter your HVAC system, preventing damage to your final filters and clogging of fins and coils. They also are easy to install—helping you reduce your maintenance efforts and minimize downtime.

02. Pre-filter

A durable pre-filter, like **the washable MECH 8 metal filter**, traps large particles, withstands harsh outdoor environments and heavy moisture. And, since it's washable, you can reuse it to save on filter replacement costs.

03. Final filter

Pair the pre-filter with a final filter that has a high dust-holding capacity, such as **the SuperFlo-V extended surface, high-efficiency filter** or **the Revolution Pocket MERV 13-A filter**.
This combination ensures efficient particle removal and a longer service life.

Balance longevity & energy efficiency

To achieve a balance between filter longevity and energy efficiency, consider the following combination.

01. Pre-filter

Use **the PreVent Air Intake Filter** and **Endurex Heavy Duty (HD) pre-filter** to capture larger contaminants and protect your downstream filters.

02. Final filter

The SuperFlo Mini-Pleat provides efficient fine particle filtration with a design that extends service life and minimizes airflow resistance.

Want to get rid of gas, smoke, or odors?

Our **CarbonWeb HCX-Mini Compact Gas Adsorber filters** get the job done! They use a heavyweight blend of carbons and potassium permanganate to remove harmful gases.

Energy efficiency

Improve energy efficiency and airflow with a filtration system that minimizes resistance.



01. Pre-filter

The PreVent Air Intake Filter and **Endurex HD Filter** work together to prevent debris from entering your HVAC system without restricting airflow. Another durable, high-performance option is **MECH 8 metal filters**. Both the PreVent and MECH 8 filters are washable and reusable, providing a sustainable alternative to disposal filters.

02. Final filter

We recommend **the Revolution Pocket MERV 13-A filter.** This product is known for its low pressure drop and high dust-holding capacity.

Revolution Pocket MERV 13-A

Captured 1 ton more dust than competitive charged filters in a data center.

Did you know

For years, data centers have relied on **MERV 11 filters** to protect equipment. But new research shows they fail to capture sub-micron particles that can lead to harmful buildup in equipment.

Upgrading to **Revolution Pocket MERV 13-A filters** can improve filtration and airflow stability, even in extreme dust conditions.

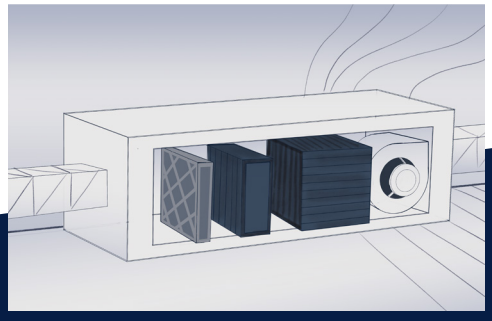
Recent test results revealed that mechanically charged **Revolution Pocket MERV 13-A** filters hold 0.5 pounds more dust per filter than competitive charged filters.

In a building with 4,000 pocket filters, **this equals removing an extra ton of dirt** from data halls and cooler media over just 3 months.

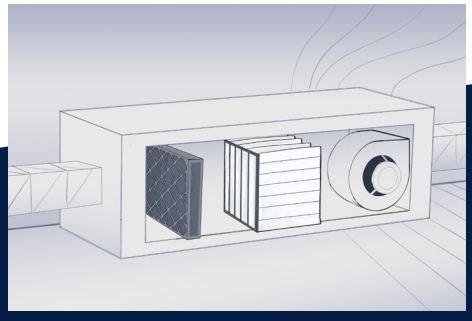
System Above Server: Rack & Air Handling Unit - Configuration Examples

Multi-stage filtration solutions tailored to needs, environment, performance goals, and budget—no trade-offs.

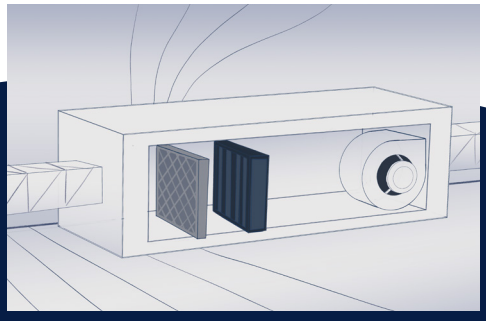
Endurex HD + SuperFlo-V + Revolution Pocket



Endurex HD + Revolution Pocket



Endurex HD + SuperFlo-V



Don't Wait Until You Have a Failure:
Future-Proof Your Data Center Now

Every decision impacts uptime. While air filtration may not always be top of mind, it plays a critical role in keeping your equipment up and running. Old, inefficient filters can erode performance, drive up energy costs, and put your equipment at risk—issues that are too costly to ignore.

Rensa's custom air filtration solutions are designed for **high efficiency, longevity, and optimal airflow**, so you can:

- **Reduce downtime risks** and safeguard mission-critical systems.
- **Lower your equipment's energy and maintenance costs by 40%** without compromising performance.
- **Extend the lifespan of your HVAC and cooling equipment**, improving overall reliability.

Every minute your data center runs with outdated or inefficient filtration increases your risk of downtime, higher energy costs, and unnecessary wear on critical equipment.

Partner with us

DON'T WAIT FOR DOWNTIME

Reach out to us to speak with a data center expert to find the right filtration solution.

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Website

www.rensafiltration.com

You can also **explore our data center air filters here.**

i. Data Center Knowledge: Data Center Power: Fueling the Digital Revolution, 2024

ii. Uptime Institute: Uptime Institute's 2022 Outage Analysis Finds Downtime Costs and Consequences Worsening as Industry Efforts to Curb Outage Frequency Fall Short, 2022

iii. The Verge: AI and crypto mining are driving up data centers' energy use, 2024

iv. NPR: Data centers, backbone of the digital economy, face water scarcity and climate risk, 2022