

THE WORLD LEADER IN CLEAN AIR SOLUTIONS



Smarter Filtration For Data Centers

MAXIMIZE PERFORMANCE, MINIMIZE COSTS, REDUCE WASTE

Expert Driven. Smart Solutions. Performance Focused.

AAF International understands the unique demands of data center environments where uptime, efficiency, and protection are non-negotiable. With deep technical expertise and a proven track record, AAF provides clean air solutions that safeguard equipment reliability, lower energy costs, and advance operational efficiency and sustainability initiatives.

Filtration Built for the Future of Data

A Changing Landscape: Data Centers on the Rise

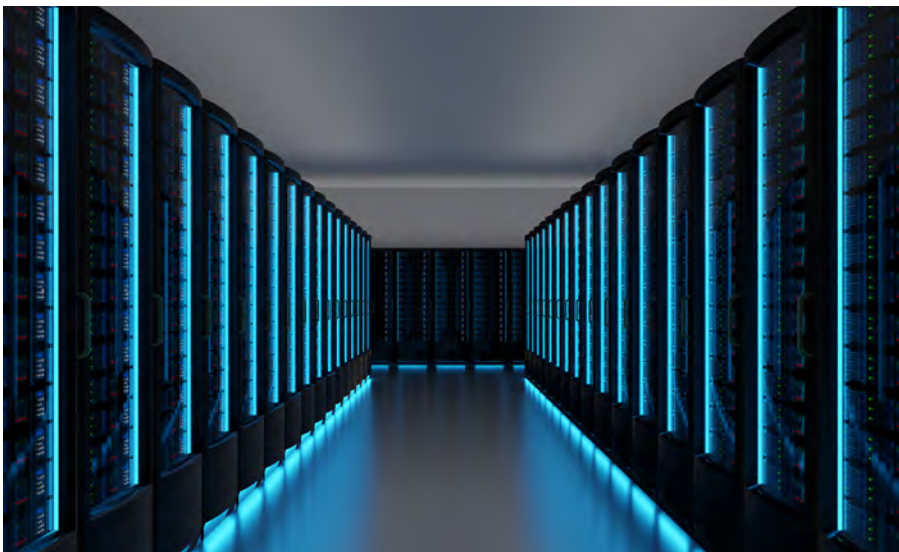
Since the early 2000s, the data center landscape has transformed, from localized server rooms to global networks of hyperscale, colocation, and edge facilities. Growth has been driven by enterprise cloud adoption, mobile connectivity, streaming platforms, and now AI-powered workloads that require even more processing power and infrastructure. These changes bring both opportunity and complexity: increased energy demand, equipment sensitivity, and higher expectations for performance and sustainability.

The Cost of Contaminants: Why Filtration Matters

The rise of AI, cloud computing, and digital transformation is fueling explosive growth in data centers, pushing facilities to deliver more compute power with greater energy efficiency. At the same time, this expansion brings new operational pressures: tighter margins, stricter sustainability goals, and increasing sensitivity of electronic components. Airborne contaminants such as sulfur compounds and fine particulate matter, often introduced through HVAC systems, pose a serious risk, accelerating corrosion, damaging equipment, and causing costly downtime. And with HVAC systems accounting for 40%–60% of a data center's total energy use, filtration plays a major role not just in protection, but in cost control.*

Smarter Systems, Stronger Performance

AAF's advanced filtration solutions are engineered to meet these dual challenges head-on. Long-lasting filters reduce maintenance labor and waste, while low-pressure-drop designs minimize HVAC energy consumption to lower your energy costs. Every system is designed to defend critical infrastructure while supporting long-term operational and environmental goals. This leads to cleaner air, stronger protection, and a lower total cost of ownership for today's high-performance data environments.



40-60%
of a data center's
energy bill
comes from
HVAC alone.
Your filters directly
impact how much
you spend.

*1. ENERGY STAR. (n.d.). Optimize airflow in HVAC systems. U.S. Environmental Protection Agency. Retrieved June 12, 2025, from https://www.energystar.gov/products/data_center_equipment/optimize-airflow-hvac

Case Study:

Cut Energy Use, Not Performance

How Smarter Filtration Can Save Up to \$180K Annually in a 100,000 ft² Data Center

A Typical 100,000 ft² Data Center

- Total annual energy use: ~20 million kWh
- HVAC share: ~45% (9 million kWh) – consistent with industry findings that cooling can account for 40–60% of total data center energy use

Energy Savings with Smarter Filtration

By upgrading to low-pressure-drop, long-life filters, HVAC fan energy use could potentially drop by 10–20%, saving **900,000–1.8 million kWh/year**.

Financial Impact

- At an average electricity rate of \$0.10/kWh, this reduction translates to **\$90,000–\$180,000** in annual savings before considering the added value of fewer filter changes and reduced cooling needs.
- This scenario does not include possible additional savings in overall filter cost/spend, labor, and disposal. These are factors to consider when choosing a supplier and manufacturer.

Operational Benefits

Upgrading filtration systems can offer several key operational benefits. Filter change frequency may decrease from four times per year to just once or twice, significantly reducing both maintenance time and waste. These improvements contribute to a faster return on investment, driven by combined savings in energy, labor, and extended equipment life.

This case study is a hypothetical example provided for illustrative purposes only. Actual savings and performance results will vary based on system design, operating conditions, energy rates, and other site-specific factors. Consult with AAF International to assess the potential benefits for your facility.

**Smarter
filtration
can save up to
\$180K
annually in a
100,000 ft²
Data Center**



Invisible Threats: Particulate and Gaseous Contamination in Data Centers

Modern data centers are highly controlled environments, but even trace levels of airborne contaminants can lead to premature hardware failure and costly downtime. The two most critical threats come from particulate matter and corrosive gases, often introduced through outside air, economizers, or unfiltered HVAC systems.

Particulate Contamination: Tiny Dust, Major Damage

Dust particles can cause mechanical obstruction, chemical corrosion, and electrical interference. Most harmful particles fall into two categories:

- **Coarse (2.5–15 µm)** – Tend to settle quickly, from sources like construction dust, pollen, or biological debris
- **Fine (0.1–2.5 µm)** – Stay airborne for long periods, often introduced via fossil fuel emissions, sea salt spray, or humidifier systems

When fine particles absorb moisture, they become chemically active—accelerating corrosion and increasing the risk of component failure.

Gaseous Contamination: Corrosion You Can't See

Gases like hydrogen sulfide (H_2S) and sulfur dioxide (SO_2) corrode copper and silver surfaces used in circuit boards and connectors. These reactions can lead to:

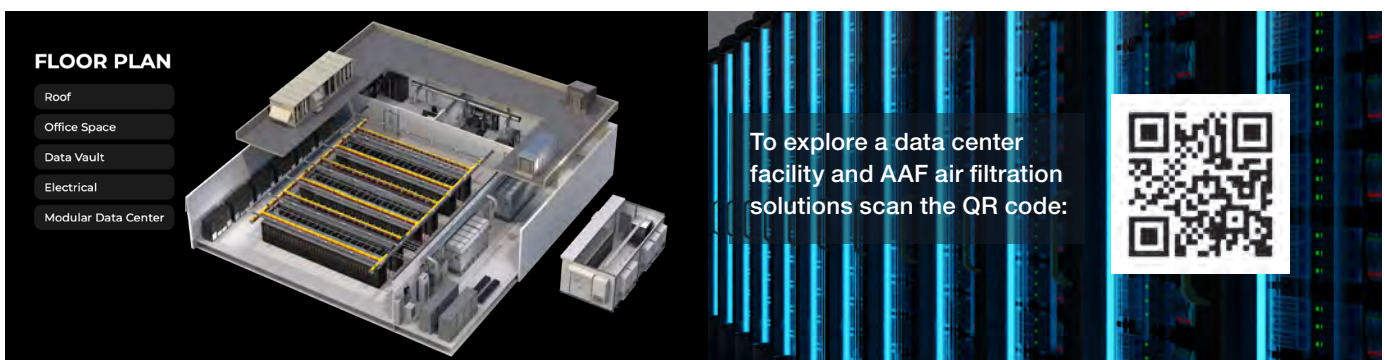
- Intermittent failures
- Signal degradation
- Total hardware breakdown

Even at low concentrations, these gases pose a serious risk in high-density server environments. That's why many hardware manufacturers follow ISA-71.04 standards to limit corrosion severity in critical areas.

Combined Impact: Elevated Risk and Reduced Lifespan

When particulate and gaseous contaminants interact, especially under humid conditions, the rate of corrosion increases exponentially. Lead-free circuit boards are especially vulnerable, making gas-phase and particulate filtration essential for equipment reliability.

Solution: AAF offers integrated filtration systems combining advanced particulate filters with gas-phase media and real-time corrosion monitoring to ensure cleaner air, longer hardware life, and uninterrupted uptime.



Data Centers Related Standards

ASHRAE TC 9.9-2011 – Environmental Guidelines for Data Processing Environments

ASHRAE's technical guidelines provide recommendations for maintaining optimal environmental conditions in data centers. They emphasize that sources of particulate and gaseous contamination should be controlled. TC 9.9 recommends that data centers maintain air cleanliness to ISO Class 8 of ISO Standard 14644-1. While humidity levels are crucial for equipment operation, the guideline highlights the importance of filtering out particulates, especially to prevent corrosive reactions exacerbated by humidity. For gaseous contamination, the environment should adhere to modified severity level G1 as defined by ISA-71.04. Regarding particulate filtration:

- For data centers without economizers, MERV 8 filters for recirculated air and MERV 11 or MERV 13 filters for incoming air are often sufficient to achieve ISO Class 8 cleanliness.
- For data centers utilizing free air cooling or air-side economizers, the required filter choice to achieve ISO Class 8 cleanliness depends on the specific outdoor air conditions and local regulations.

ISA-71.04-2013 – Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants

This International Society of Automation (ISA) standard is crucial for specifying environmental conditions to protect sensitive electronics. It defines airborne contaminant classes (e.g., G1 Mild, G2 Moderate, G3 Harsh, GX Severe) based on the measured reactivity of the air, typically assessed by copper and silver corrosion rates. The standard covers various fixed installations, including data centers and network equipment, providing critical guidelines for normal operation, as well as transportation and storage conditions. Adherence to this standard helps ensure the reliability and longevity of electronic hardware by limiting exposure to corrosive gases.



Built for Those Who Keep Data Centers Running

AAF's air filtration systems are designed for data center operators, facility managers, procurement teams, and engineering leaders responsible for maintaining uptime, cost control, reducing operational risk, and meeting sustainability targets. Whether managing an enterprise data center, colocation facility, hyperscale operation, or edge site, our solutions help protect mission-critical equipment while managing energy and labor costs.

By choosing AAF, you gain:

- **Improved energy efficiency** through low-resistance, high-performance filtration.
- **Lower maintenance demands** with longer filter life and fewer system disruptions.
- **Support for sustainability goals** by reducing waste, energy use, and downtime.
- **Protection of sensitive electronics** from corrosion and particulate damage.
- **Compliance with industry air quality standards** such as ASHRAE and ISA 71.04.

Designed for Your Needs

Whether you're focused on uptime, cost, compliance, or all of these, AAF supports:

- **Data center operators** protecting critical infrastructure
- **Facility managers** optimizing HVAC performance
- **Procurement teams** balancing cost and quality
- **Engineering leaders** driving ESG and reliability goals

In an industry moving fast to support AI and digital transformation, AAF keeps your infrastructure running efficiently, reliably, and responsibly. Our filtration solutions are designed to support ongoing performance as your operations grow and evolve.

Smarter Systems for a Stronger Bottom Line

Energy Efficiency: Maximize Uptime with Minimal Power Draw

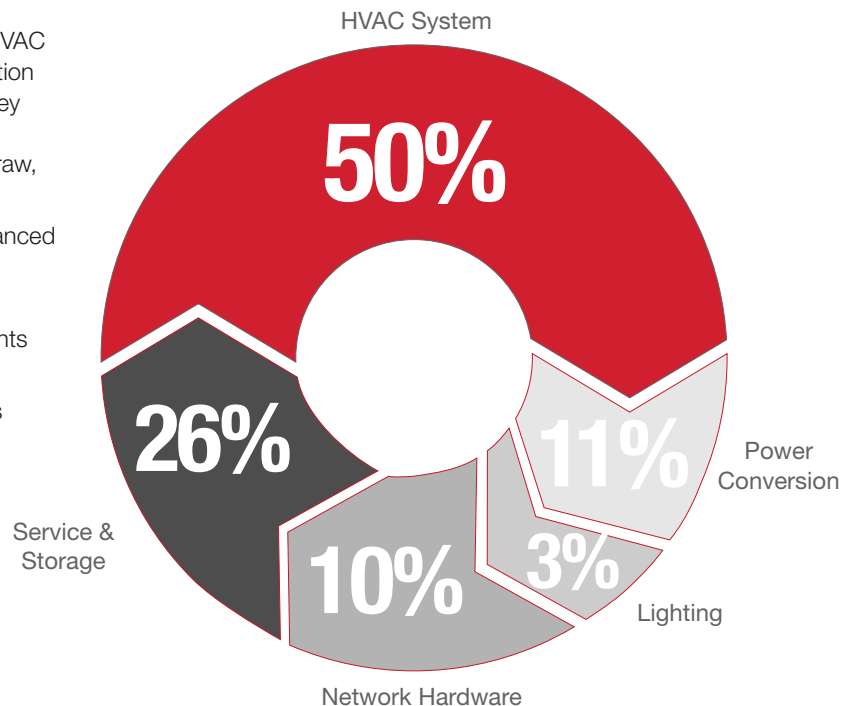
Data centers are power-intensive operations and HVAC systems account for 40% - 60% of that load. Filtration directly impacts energy performance, making it a key area for cost reduction. AAF filtration solutions are engineered to deliver protection with less energy draw, supporting uptime without inflating power bills.

High-Efficiency, Low-Resistance Filters – Advanced media and designs reduce pressure drop, allowing maximum airflow with less energy use.

Energy-Smart Performance – Keeps contaminants out so equipment runs cooler and more reliably.

Optimized Air Management – Clean air supports cooling efficiency and stable HVAC operation.

Power Load Distribution in Data Centers*



*Approximate values based on typical industry estimates.

Labor Savings: Reduce Maintenance Burden and Avoid Downtime

AAF filtration solutions help minimize disruptions and labor demands by extending filter life and reducing the need for manual intervention.

- **Longer Filter Life** – Advanced filter media and system design extend service intervals and reduce changeout frequency.
- **Fewer Equipment Failures** – By preventing corrosion and dust buildup, our systems reduce the need for reactive repairs and component replacement.
- **Simplified Monitoring** – AAF offers air quality testing and real-time monitoring solutions, so your team can stay focused on higher-value tasks, not routine checks.

Bottom Line: Spend less time fixing problems and more time optimizing performance.

Sustainability: Reduce Waste and Advance Your ESG Goals

As companies strive to meet environmental and social governance (ESG) targets, sustainability is no longer optional: it's a core business value. AAF filtration systems support ESG initiatives by minimizing environmental impact without compromising performance.

- **Less Waste, Fewer Replacements** – Longer filter life means less waste and fewer disposal cycles.
- **Lower Environmental Impact** – Filtering harmful airborne contaminants helps prevent equipment failures and extends infrastructure lifespan, reducing waste and premature e-waste disposal.
- **Compliance and Certification Support** – Our solutions contribute to LEED, WELL, and RoHS aligned initiatives by maintaining clean air standards and protecting sensitive electronics from corrosive gases.

Bottom Line: Cleaner air means longer equipment life and reduced electronic waste, key contributors to a more sustainable data center.

Comprehensive Protection for Modern Data Centers

Whether managing a hyperscale facility, a colocation environment, or an edge deployment, AAF delivers proven filtration solutions that help meet the most demanding performance, sustainability, and reliability targets. In today's high-stakes data environments, where downtime is costly and clean air is critical, our systems are built to go beyond basic protection, supporting smarter operations at scale.

Our data center solutions are designed to:

Prevent equipment failures caused by particulate and corrosive gas contamination, minimizing downtime and extending asset life.

Support compliance with air quality standards such as ASHRAE and ISA 71.04, while aligning with LEED, WELL, and ESG targets.

Enhance operational resilience with high-efficiency, low-maintenance filters designed to perform under continuous, high-volume loads.

Reduce total cost of ownership through longer filter life, lower energy draw, and fewer disruptions to your operations.

From maximizing uptime to advancing sustainability, AAF filtration solutions give you the confidence to scale securely, efficiently, and responsibly, no matter where the future of data takes you.

Particulate Filtration Solutions

Pleated Panel Filters: Performance, Longevity, and Energy Savings

Engineered for consistent air quality and extended service life, AAF's pleated panel filters support both standard and specialized data center needs. With high dust-holding capacity and low pressure drop, they help reduce energy use, maintenance, and overall operating costs.

- MERV 8–13 ratings
- Lowest life cycle pressure drop and highest Dust Holding Capacity (DHC)
- Top-performing self-supported pleated filter (PerfectPleat HC M8)
- MERV 13 models improve Indoor Air Quality (IAQ) and support LEED credits
- Options for high temperature and high velocity environments

MEGApleat® M9
Prefilter



PerfectPleat® HC M8
Prefilter



Bag Filters: Proven Innovation, Reliable Performance

As the original inventor of the bag-style filter, AAF continues to lead in performance and efficiency. Designed for long service life and reduced energy consumption, our **DriPak® GX** filters feature a proprietary tapered-pocket structure and microfine fiberglass media that maximize dust-holding capacity while maintaining consistent airflow. Ideal for both pre- and final filtration in data center HVAC systems, the DriPak GX delivers reliable performance with minimal pressure drop and when used as a final filter, it is engineered to perform without the need for a separate prefilter.

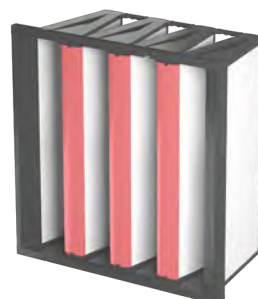
- Low-pressure drop reduces HVAC energy usage
- Proprietary tapered pockets ensure stable, consistent airflow

High Efficiency Extended Surface Filters: Durable Protection for Critical Environments

For environments with demanding airflow conditions, AAF's high efficiency extended surface filters deliver the structural strength and filtration performance required to maintain uptime. With reinforced pleat designs, these rigid filters remain stable under high-volume, turbulent, or variable airflow, making them ideal for critical areas where air purity and equipment protection are non-negotiable.

- Most efficient v-bank filter in its class
- MERV 15/15A, MERV 14/14A, and MERV 11 ratings
- Decreases initial resistance by up to 20%
- Best-in-class burst pressure of 25" WG

VariCel® VXL RC
Final Filter



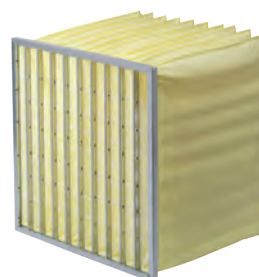
- MERV 14, MERV 13, and MERV 11 efficiencies
- Most efficient 4" filter with extended life
- Very low initial resistance saves energy costs
- Durable, moisture-resistant design

PrecisionCell® III
Final Filter



- Microfine fiberglass media captures fine particulate efficiently
- Available in MERV 15/15A, 13/13A and 11 ratings
- Galvanized steel header for structural integrity
- Depth options: 15", 22", and 30"
- UL 900 classified; maximum temperature: 158°F (70°C)

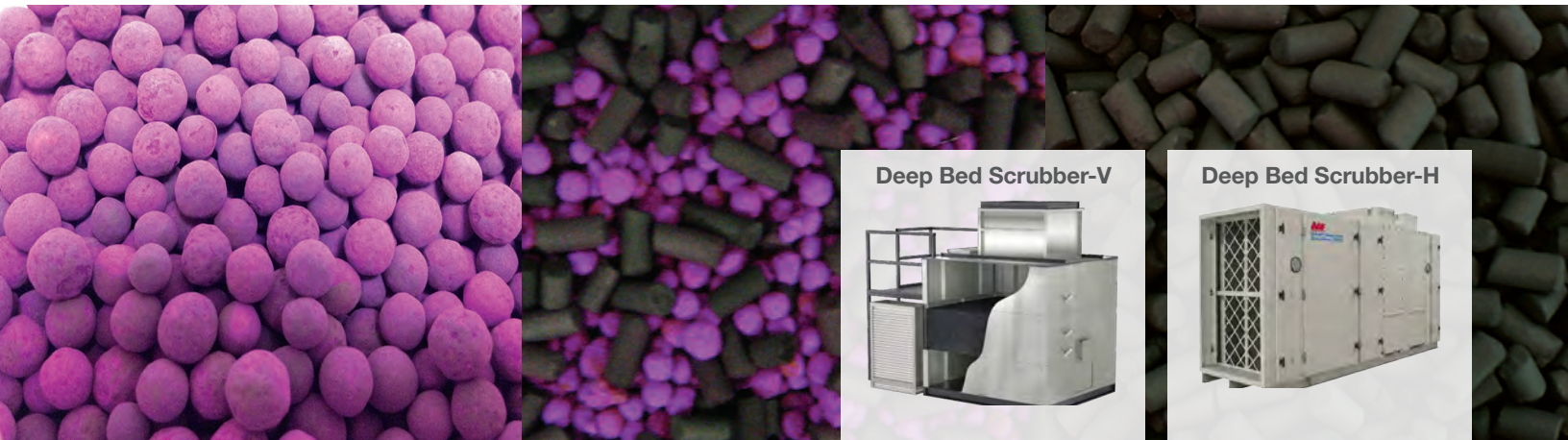
DriPak® GX
Prefilter | Final Filter



Gaseous Filtration Solutions

SAAF™ Products: Targeted Defense Against Corrosive Contaminants

AAF SAAF products are engineered to remove corrosive gases that damage sensitive electronics. Combined with particulate filtration, they deliver a full-spectrum solution for reliable, long-term equipment protection in critical environments.

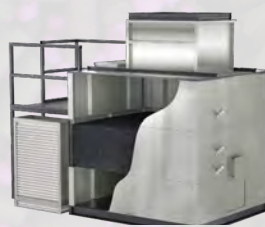


- Full range of gas-phase housings and filtration systems
- Patented media cassettes for energy savings and legacy system compatibility
- SAAF Canister: compact gas-phase filter with one-inch chemical bed, compatible with standard systems
- SAAF Deep Bed Scrubbers: available in both horizontal and vertical orientations, each featuring a media bed designed to contain a deep layer of common adsorbents
- Complete media line: adsorbents, oxidants, and blends
- Environmental assessments per ISA S71.04
- RoHS-compliant, meets ASHRAE TC 9.9 guidelines
- SAAF Tech Tools software for system design and proposals

Smart Monitoring for Enhanced Protection

For data centers using air-side economizers or gas-phase filtration, real-time monitoring is recommended to detect and respond to environmental changes that may introduce corrosive gases. Technologies like SAAFShield™ provide continuous insight into air quality and filter performance, helping to safeguard critical infrastructure.

Deep Bed Scrubber-V



Deep Bed Scrubber-H



SAAF™ Cassette HD
Gas Phase



VariSorb® HC
Final filter



SAAF™ Front
Access Housing



SAAF™ Canister
Gas Phase



AmAir®/CE
Prefilter



Proven Expertise of AAF International

AAF International offers the most comprehensive air filtration portfolio in the industry, including particulate and gas-phase filters, to provide a customized clean air solution. Each product is carefully designed, manufactured, and tested in full compliance with all applicable standards to meet the most challenging demands with the lowest Total Cost of Ownership.

Contact your local AAF representative for a complete list of AAF Air Filtration Product Solutions.

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AAF International has a policy of continuous product research and improvement. We reserve the right to change design and specifications without notice.

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ISO Certified Firm

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