



Commercial Application Solutions

GREEN Buildings

*Air Filtration Strategies
for Sustainable Buildings*



Better Air is Our Business®



GREEN Buildings

Our Qualifications

AAF International makes a wide variety of products for removing and controlling airborne particulates and gaseous contaminants. The scope of applications ranges from ultra-clean air for electronics and pharmaceutical manufacturing, to preventing the spread of infection in hospitals, to removing odors and harmful gases in occupied spaces. We protect people, processes, and systems every minute of every day.

AAF is a company with an outstanding industry record. We have provided clean air for more than 88 years. Superior industry knowledge and an outstanding team of air filtration professionals mean our customers receive top quality products and services at a competitive price.

AAF Green Mission: *Establish AAF as the industry leader in supplying "green" air filtration solutions for sustainability. AAF solutions will be robust and fulfill both the requirements and intent of the guidelines and regulations of federal, state, local, and private initiatives to reduce energy consumption and reduce the carbon footprint of AAF products from cradle to cradle.*

Proper Air Filtration Strategies Earn LEED® Credits

Today's building owners and operators look for sustainable designs and operating practices. Green building, or sustainable building, is the practice of increasing the efficiency with which buildings use resources through a building's life-cycle from siting to design, construction, operation, maintenance, renovation, and deconstruction. This is achieved by efficiently using energy, water, and other resources while reducing impact on human health and the environment. The benefits of green buildings

include the value-added perception of social responsibility, enhanced Indoor Air Quality (IAQ), and lower operating costs. Many commercial buildings are seeking Leadership in Energy and Environmental Design (LEED®) certification. The LEED Green Building Rating System™, administered by the U.S. Green Building Council, is the nationally accepted benchmark for designing and sustaining green buildings.



Air filters can be a factor in the following rating systems:

- *LEED for Existing Buildings: Operations and Maintenance provides a benchmark for building owners and operators to measure operations, improvements, and maintenance.*
- *LEED for Commercial Interiors is a benchmark for the tenant improvement market that gives the power to make sustainable choices to tenants and designers.*
- *LEED for Core and Shell aids designers, builders, developers, and new building owners in implementing sustainable design for new core and shell construction.*
- *LEED for Retail recognizes the unique nature of retail design and construction projects and addresses the specific needs of retail spaces (pilot phase).*
- *LEED for New Construction and Major Renovations is designed to guide and distinguish high-performance commercial and institutional projects.*
- *LEED for Schools recognizes the unique nature of the design and construction of K-12 schools and addresses the specific needs of school spaces.*
- *LEED for Healthcare promotes sustainable planning, design, and construction for high-performance healthcare facilities (pilot phase).*

Proper Air Filtration Strategies Earn LEED® Credits

Credits are awarded towards certification in six categories. Proper air filtration strategies contribute to four of the six categories:

- Energy and Atmosphere (Efficiency)
- Indoor Environmental Quality
- Materials and Resources
- Innovation in Design/Operations

Energy and Atmosphere (Efficiency)

Demonstrating compliance with ASHRAE Standard 90.1-2007 is the first step for meeting the energy and atmosphere requirements. Whole-building

energy simulation, following ASHRAE approved procedures, establishes energy cost savings. The number of credits earned is relative to energy cost reduction.

Indoor Environmental Quality

Maintaining the health and comfort of building occupants by enhancing IAQ is the basis of the Indoor Environmental Quality category. Credits can be obtained by documenting the impact of IAQ on occupant productivity, upgrading filter efficiency, establishing a schedule for filter maintenance, and eliminating conditions that might lead to poor IAQ.



Life Cycle Valuation Program Optimizes Efficiency and Reduces Maintenance Costs

Our expertise in airborne particulate and gaseous filtration systems, combined with our innovative product line, uniquely qualifies us to assist you throughout the processes required to earn LEED credits. While it is important to use MERV 13 or higher efficiency filters, it is also important to implement strategies that minimize energy costs by selecting appropriate filters and using best HVAC operating practices.

Our exclusive Life Cycle Valuation (LCV) program helps you minimize overall operating costs by modeling various filtration strategies. Select and compare critical design and operation criteria associated with your specific needs to create reports that help put costs into perspective. LCV not only provides you with critical budget information, it also gives you the ability to tailor AAF's filtration offerings to optimize your filtration maintenance program.



Contact your AAF Sales Representative to learn how this exclusive program can help you develop energy saving solutions and qualify for LEED® credits.

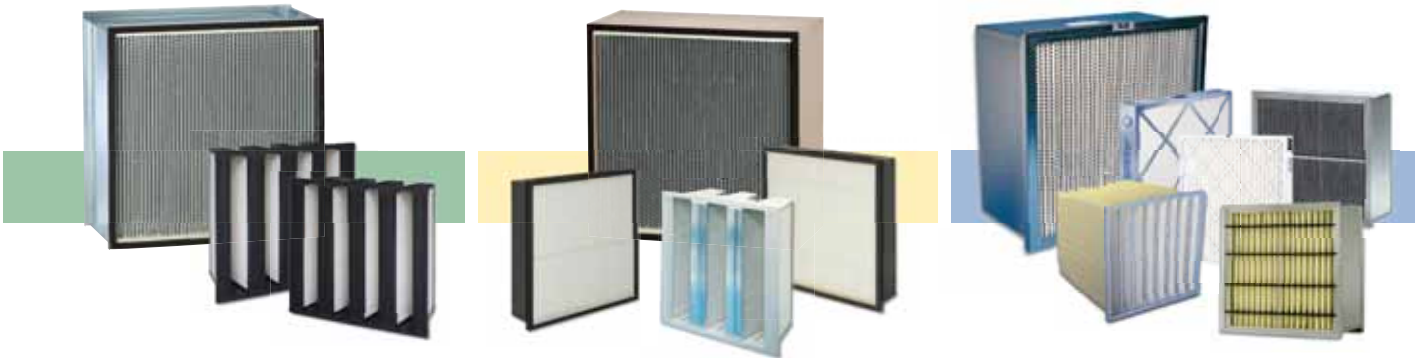
Particulate Air Filtration Solutions

Environmental Impact

The four main factors used to determine the environmental impact of a filter are IAQ, Energy Savings, Source Material, and Disposal. IAQ is important to the health and well being of individuals within the building. The higher the efficiency of a filter, the better the IAQ. Filters with lower pressure drop and higher efficiency will lower the operating cost of your HVAC system, resulting in Energy Savings. Lower energy consumption reduces green house gas emissions. Source material considers potential environmental impact of raw materials used to make the filters. Finally Disposal refers to the impact of disposing the filter at the end of service.

IAQ (Efficiency Rating)	BEST	BETTER	GOOD
HEPA	MEGAcel™ I	AstroCel® I	
MERV 16*	BioCel® VXL	BioCel® M-Pak	BioCel I®
MERV 15*	VariCel® VXL	VariCel® V	VariCel® II DriPak® 2000 VariCel® RF
MERV 14*	VariCel® VXL	VariCel® M-Pak	VariCel® VariCel® II DriPak® 2000 VariCel® RF
MERV 13*	VariCel® VXL	VariCel® M-Pak	VariCel® AmAir® 1300

*All performance data is based on ASHRAE Standard 52.2 test method.



BEST: MEGAcel™ I, VariCel® VXL, and BioCel® VXL

BETTER: BioCel® M-Pak, AstroCel® I, VariCel® V, and VariCel® M-Pak

GOOD: VariCel®, DriPak® 2000, VariCel® II, AmAir® 1300, BioCel I®, and VariCel® RF

Gas-Phase Filtration Solutions

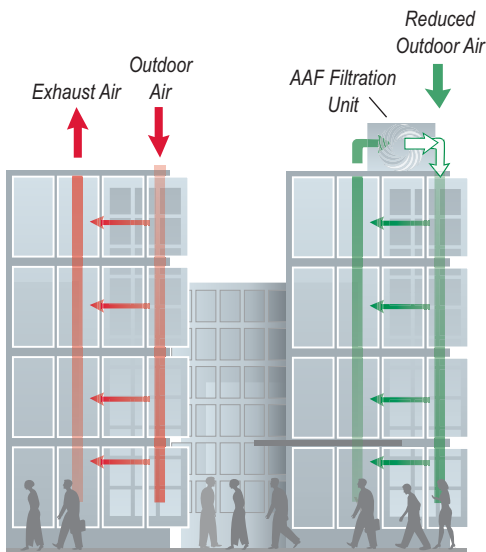


Reduce Energy Cost Without Impacting Indoor Air Quality

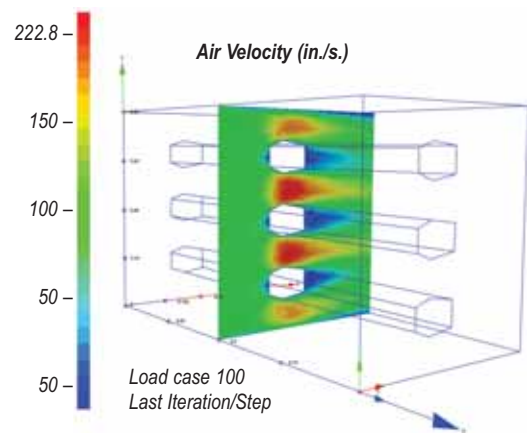
SAAF™ gas-phase filtration products provide options for reducing energy costs associated with the conditioning of outdoor ventilation air, resulting in lower energy consumption and smaller carbon footprints. Gas-phase filtration can be used to reclaim building exhaust air (e.g., hotel bathroom exhaust) to reduce the conditioning required for replacement make-up air. In addition, gas-phase filtration can be used to reduce the amount of outdoor ventilation air using the Indoor Air Quality Procedure as detailed in the ASHRAE Standard 62 “Ventilation for Acceptable IAQ”. AAF can help users determine the best product options for providing good indoor air quality while minimizing the energy impact.

SAAF™ Cassettes

SAAF V-bank Cassettes are constructed from High-Impact Polystyrene (HIPS) and come pre-filled with SAAF Chemical Media. Unique, patent-pending design ensures maximum media utilization and improves fit and sealing, even when deployed in older cassette holding systems. Computational Fluid Dynamics (CFD) modeling and performance tests confirm the most energy efficient design. The resulting design and construction surpasses any competitor’s cassettes in the market, while allowing users a truly better design with value-enhancing features.



The “green” building, right, saves energy with an AAF Filtration system that conditions and recirculates reclaimed exhaust air.



Computational Fluid Dynamics (CFD) view of airflow through cassette screen. Screen ribs are designed to contain media while maximizing airflow exposure and promote complete utilization of media.

AAF Strategies

LEED® 2009 for Existing Buildings: Operations and Maintenance

LEED Category

Recommended Activities

Energy and Atmosphere

Prerequisite 2: Minimum Energy Efficiency Performance
Required Activity

Use AAF's Life Cycle Valuation (LCV) program to understand the impact of the filter airflow resistance on HVAC system energy usage costs.

Credit 1: Optimize Energy Efficiency Performance
1-18 Points

Complete life cycle and energy cost analysis on the HVAC filter system and switch to a lower resistance air filter to reduce energy costs and loads.

Credit 3.2: Performance Measurement: System-Level Metering
1-2 Points

To determine the appropriate change-out cycle for filters, use pressure gauges to measure resistance to airflow.

Credit 6: Emission Reduction Reporting
1 Point

Use an energy analysis tool to determine the amount of energy saved and Green House Gas (GHG) emissions reduced by using low-resistance air filters. For internally generated chemical contaminants use SAAF products for source control.

Materials and Resources

Credit 6: Solid Waste Management: Waste Stream Audit
1 Point

Switch from standard-capacity filters and/or bag style to mini-pleat V-bank final filters. This extends filter life to reduce change-outs and waste streams, while minimizing resistance to airflow.

Indoor Environmental Quality

Prerequisite 2: Environmental Tobacco Smoke (ETS) Control
Required Activity

Install SAAF equipment and use SAAF chemical media to remove airborne contaminants from smoking room. Install HEPA (High Efficiency Particulate Air) filter to remove particulates from exhaust air.

Credit 1.1: IAQ Best Management Practices: IAQ Management Program
1 Point

Perform surveys and educate maintenance staff about filtration fundamentals and application of various air filtration technologies by using programs offered by an AAF representative and the National Air Filter Association.

Credit 1.4: IAQ Best Management Practices: Reduce Particulates in Air Distribution
1 Point

Install MERV 13 or above air filters. Follow a regular schedule for air filter maintenance to keep unfiltered bypass air from entering the ductwork and the breathing air.

Credit 1.5: IAQ Best Management Practices: IAQ Management for Facility Alterations and Additions
1 Point

Install MERV 8 filters at each return air grill for air handlers used during construction. Conduct a two-week building flush-out with new air filters and 100% outdoor air prior to occupancy.

Innovation in Operations

Credit 1: Innovation in Operations
1-4 Points

Upgrade to a MERV 14 or 15 air filters, which typically have lower pressure drop.

Document supplier source reductions, use air filters with recycled content, and utilize gaskets on all filters and holding frames.

AAF Strategies

LEED® 2009 for New Construction* and Major Renovations

(*includes LEED for Schools, LEED for Commercial Interiors, and LEED for Core and Shell Development)

LEED Category

Recommended Activities

Energy and Atmosphere

Prerequisite 2: Minimum Energy Performance
Required Activity

Use AAF's LCV program to understand the impact of the filter airflow resistance on HVAC system energy usage costs.

Credit 1: Optimize Energy Performance
1-19 Points

Use an energy analysis tool to understand the impact of the filter airflow resistance on HVAC system energy usage costs.

Credit 1.3 Optimize Energy Performance, HVAC (LEED for Commercial Interiors)
5-10 Points

Complete life cycle and energy cost analysis on the HVAC filter system and switch to a lower resistance air filter to reduce energy costs and loads.

Credit 5: Measurement and Verification
3 Points (2 Points for Schools)

To determine the appropriate change-out cycle for filters, use pressure gauges to measure resistance to airflow.

Credit 3: Measurement and Verification (LEED for Commercial Interiors)
2-5 Points

Credit 5.2: Measurement and Verification – Tenant Submetering (LEED for Core and Shell Development) 3 Points

Indoor Environmental Quality

Prerequisite 1: Minimum IAQ Performance
Required Activity

Install MERV 6 or above air filters.

Prerequisite 2: Environmental Tobacco Smoke (ETS) Control (N/A LEED for Schools)
Required Activity

Install SAAF equipment and use SAAF chemical media to remove airborne contaminants from smoking room. Install HEPA filter to remove particulates from exhaust air.

Credit 1: Outdoor Air Delivery Monitoring
1 Point

Use pressure gauges to measure resistance to airflow to determine the appropriate change-out cycle for filters.

Credit 3.1: Construction IAQ Management Plan: During Construction
1 Point

Install MERV 8 filters at each return air grill for air handlers used during construction.

Credit 3.2: Construction IAQ Management Plan: Before Occupancy (N/A LEED for Core and Shell Development)
1 Point

Conduct a two-week building flush-out with new air filters and 100% outdoor air prior to occupancy.

Credit 5: Indoor Chemical and Pollutant Source Control
1 Point

Install MERV 13 or above air filters. Follow a regular schedule for air filter maintenance to keep unfiltered bypass air from entering the ductwork and breathing air. Install SAAF equipment and use SAAF chemical media to remove airborne contaminants.

Innovation in Design

Credit 1: Innovation in Design
1-5 Points (1-4 Points for Schools)

Document supplier source reductions, use air filters with recycled content, and utilize gaskets on all filters and holding frames.

AmericanAirFilter®

GREEN Buildings

Minimizing Environmental Impact

AAF is committed to operating with a goal of sustainability. We have implemented several initiatives to work and manufacture in an environmentally responsible manner and contribute more to protecting our planet by using fewer natural resources and reducing our carbon footprint.

Our products protect people, processes, and systems. Now we strive to protect our planet too. Some of our green initiatives include:

- **Create products using a cradle-to-cradle philosophy**
- **Recycled materials used in our manufacturing processes**
- **Recycled paper used in printed marketing materials**
- **Incorporating sustainable energy usage products**
- **Applying lean principals to manufacturing processes**
- **AAF Green campaign to raise awareness of LEED Certification**
- **Member of U.S. Green Building Council**
- **Partnership with Energy Star**

The Green Standard

Introduced in 2010, ASHRAE Standard 189.1 provides the minimum requirements for sustainable or green buildings. The standard is designed to complement green building rating programs, with the hope that it will be integrated into the programs as a prerequisite or compliance requirement.

Standard for the Design of High-Performance Green Buildings

ANSI/ASHRAE/USGBC/IES Standard 189.1-2009

7.5.2 Annual Energy Cost

Use AAF's LCV program to understand the impact of airflow resistance and energy costs associated with air filters.

8.3.1.3 Filtration and Air Cleaner Requirements

Particulate Matter a.1. Install MERV 8 or above filters.

Particulate Matter a.2. Install MERV 13 or above air filters.

Bypass Pathways c. Utilize gaskets on all filters and holding frame.

10.3.1.4 Indoor Air Quality (IAQ) Construction Management

Conduct a two week building flush-out with new air filters and 100% outdoor air prior to occupancy.

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10300 Ormsby Park Place Suite 600
Louisville, Kentucky 40223-6169

www.aafintl.com
Customer Service 888.AAF.2003
Fax 888.223.6500



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ISO Certified Firm

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