AmericanAirFilter®

Cleanroom

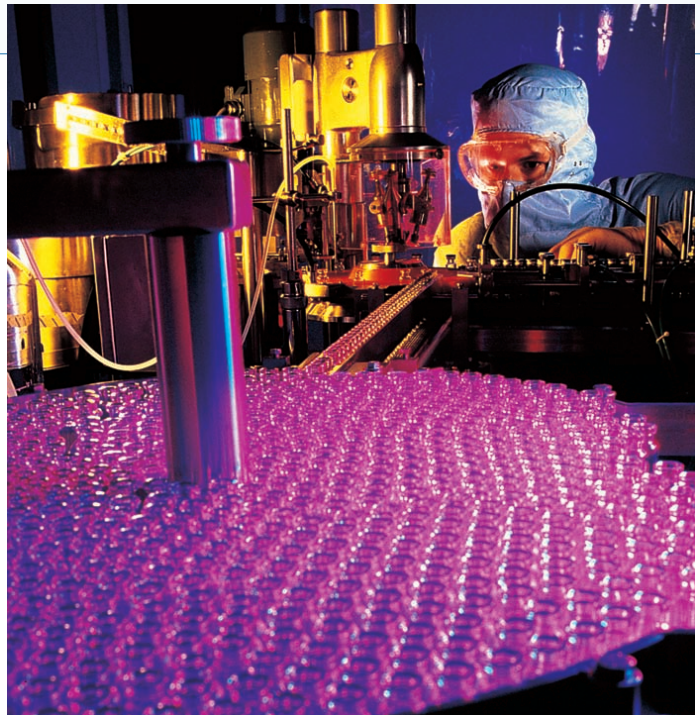
Advanced Solutions for the Removal of Airborne Particulate and Gaseous Contaminants

Better Air is Our Business® AAF® INTERNATIONAL

AmericanAirFilter®

Cleanroom Particulate and Gas-Phase Products and Systems

Industry Leader



Our Qualifications

AAF International is the name recognized globally for quality, expertise, and innovation in the cleanroom industry. As a world leader in cleanroom filtration, we understand the critical nature of your cleanroom operations and processes. We know contamination control is vital to maintain product integrity and meet stringent governmental regulations.

What this means is you will be served by a company with an outstanding industry record. The caliber of our existing customers and diversity of their cleanroom requirements enable us to provide systems and products based on a broad industry perspective. Industry knowledge and an experienced cleanroom team enable us to provide quality products and services at a competitive cost.

Our goal is simple, provide the highest quality cleanroom filtration systems and products.

Who We Are

AAF International traces its roots to Bill Reed, a skilled engineer and clever entrepreneur who recognized in 1921 that cleaning the air was critical to the growth of society, the development of technology, and the protection of human health. He developed the Reed Air Filter which represented the initial step in building an international company that globally dominates the air filtration industry – AAF International.

Today, selling under the AAF® and AmericanAirFilter® brand names, AAF clean air products and systems offer the most comprehensive clean air solutions available in the the world. Our products are the industry benchmarks for quality and performance, from simple roughing filters, to air pollution control, to gas contaminant removal, to the highest efficiency filters used in the most stringent clean environments.

From its world headquarters in Louisville, Kentucky, AAF maintains operations in 22 countries with more than 2,600 employees worldwide and sales offices in 260 locations around the globe.

AAF headquarters, Louisville, Kentucky

AAF is supported in its international ventures through the resources of its parent company OYL Industries Berhad, based in Malaysia. OYL, in turn, is owned by Daikin Industries, Ltd., Osaka, Japan, a diversified international manufacturing company and a global leader in air conditioning.

AAF offers the most comprehensive global manufacturing capabilities in the air filtration industry, and each facility is specifically designed to manufacture and test the most complex clean air solutions. Additionally, each facility manufactures to the appropriate international quality and performance standards.

As you read these words, AAF filtration solutions are cleaning air around the globe making us more productive, protecting processes that produce technology and products that improve our lives, and providing protection from airborne threats that damage our health. Through more than 85 years of innovation and leadership in air filtration, our motto has not deviated from that stated by Bill Reed those many years ago — *Better Air is Our Business*®.

Industry Overview

Many manufacturing processes require that fine particulate and Airborne Molecular Contaminants (AMCs) be carefully controlled. Today, with increased governmental regulations and more exacting self-imposed guidelines, many cleanroom industries are moving toward ultra-clean processes to ensure product quality and limit financial liability. Contamination-controlled environments are becoming a critical component for products of all types. Cleanroom particulate and gas-phase filters help to control the entire airflow environment in such industries as microelectronics, pharmaceutical manufacturing, food processing, and hospital critical care areas.

A cleanroom air filtration system must be installed to control the unwanted gaseous contaminants and airborne particulates that contaminate processes. Corrosive gases can cause severe harm to the functioning parts of many systems. While vital to maintaining air quality in a cleanroom, air filtration is not the only factor. Strict adherence to production procedures and personal hygiene are essential since contamination can lead to costly downtime and increased production and maintenance expenses.

Our cleanroom team understands that the requirements for clean environments differ for each industry. Our experience in developing cleanroom solutions for a variety of applications gives us the know-how to tackle any project.

Industry Competence

AAF has designed and manufactured cleanroom products since the inception of the industry. We are unsurpassed in our ability to engineer cleanroom systems to any specification. In fact, we pioneered many of the techniques and products used in cleanroom filtration today. We have the industry experience and resources to handle projects from small cleanrooms to large “ballroom”, Class 1 (ISO 14644-1) applications. Our cleanroom filtration products are utilized by leading manufacturers in the microelectronics, pharmaceutical, and biotechnology industries around the world.

AAF engineers are active in standardization committees in the USA and Europe. We play an important role in establishing new standards and recommending practices for cleanroom applications. As an example, our engineers were key contributors in developing and writing Institute of Environmental Sciences and Technology Recommended Practices. This professional competence is reflected in the design, manufacture, and testing of each cleanroom filtration solution we produce.

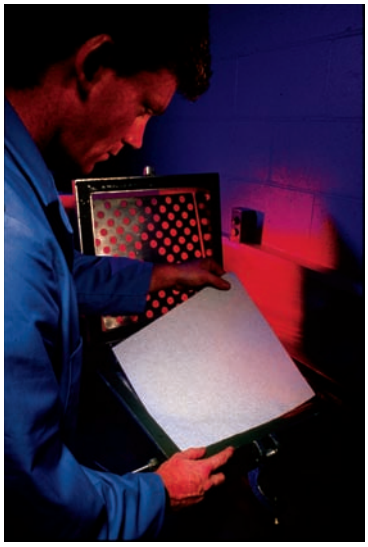
Proprietary media and filter design allow AAF to meet the most stringent requirements of any cleanroom application.

ISO 14644-1 defines a cleanroom as an area in which the concentration of airborne particles is controlled and which contains one, or more, clean zones. Various classes of cleanroom are specified in terms of the maximum permissible number and size of particles per cubic meter.

AAF Advantage

Worldwide Manufacturing Advantage

AAF recognizes the global nature of the cleanroom industry, and we are positioned to respond to projects anywhere in the world. We offer the most comprehensive manufacturing capabilities in the industry. Our production facilities are located worldwide, and are specifically designed for the manufacture of filtration products and equipment in compliance with established standards. We fabricate in a variety of materials to satisfy any application. Each facility has a full range of capabilities that give us flexibility in meeting our customers' specifications and deadlines.



Media development begins with hand sheets in our media supplier's test lab.

Energy Savings with The Lowest Pressure Drop in the Industry

Cleanroom filtration systems must handle relatively large volumes of air. Consequently, operating costs are a prime consideration in cleanroom design. One of the most important areas to be evaluated, where AAF leads the industry in energy savings, is airflow resistance, or pressure drop, across HEPA filters.

AAF understands cleanrooms and filtration. We challenged our cleanroom team to develop proprietary specifications for filter media with the highest efficiency and least possible airflow resistance. Our next challenge was to create a working relationship with a media supplier that would meet our specifications and quality standards. The challenges were met. The result is cleanroom filters engineered and assembled to give you the efficiency you demand, with the lowest possible pressure drop.

Pressure drop is measured by a manometer as the test filter is subjected to a metered air volume. Testing on a volumetric basis is specified in the Institute of Environmental Sciences RP-CC007 recommended practice. Our engineers calculate the total square footage of usable media pack area (outside dimensions of filter minus the frame thickness and adhesive) and multiply this number by 100 FPM to determine an accurate volumetric test flow. (This value is approximately 720 CFM for a nominal 24" x 48" filter.) This method simulates actual cleanroom airflow conditions ensuring a true measurement of pressure drop. This is important because increased airflow resistance means more cost in the construction and operation of your cleanroom. You need the most accurate and complete testing to determine pressure drop across a filter. Our years of experience have proven that the volumetric test is essential to determining true pressure drop across a HEPA or ULPA filter.

AAF Capabilities

The Cleanroom Team

The AAF cleanroom team is comprised of professionals focused solely on cleanroom applications. The team is active throughout the life-cycle of every project: specification review, engineering design, project management, manufacturing and process control, testing and quality assurance, and field support.

Our goal is to work with you to create a cleanroom filtration system that completely protects your process or products. We stand ready to provide engineering support for the tough applications and project management support for the most complex designs.

We make it easy for you to work with us. Attention to detail and a continuing dialogue between our cleanroom team and our customers are the reasons why so many OEMs and contractors have selected AAF as their source for cleanroom air filtration and gas-phase products.

AAF plant, Columbia, Missouri, USA

Products and Design Services

AAF specializes in airborne particulate and gaseous contaminant removal for cleanroom applications. A complete line of high-efficiency cleanroom filters is available. All AAF filters are designed to comply with applicable standards and practices.

In addition, AAF can custom design cleanroom air filtration products to meet the most demanding airflow and efficiency requirements.

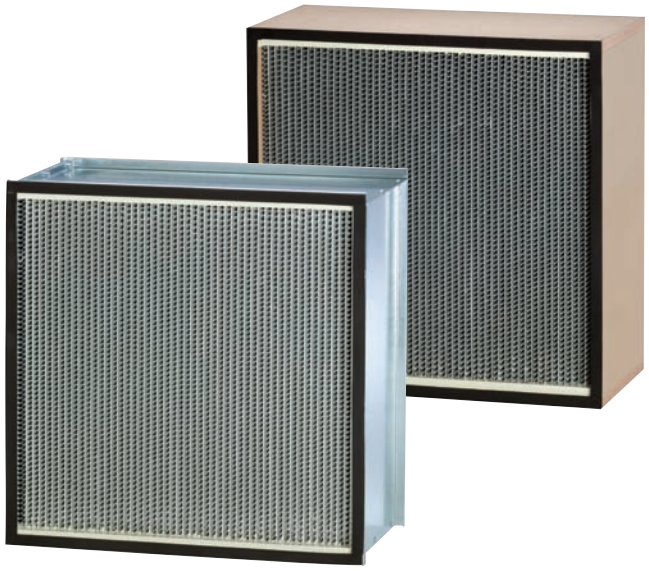
We have a full range of compatible products, including:

- **Ceiling Modules**
- **Duct Housings**
- **Ceiling Grid Systems**
- **Fan Filter Modules**
- **Front Access Frames**
- **Cassettes**
- **Side Access Housings**

AAF high purity filters are used in contamination-controlled cleanroom environments around the world.

High Efficiency Particulate Air (HEPA) Filters and Ultra Low Penetration Air (ULPA) Filters

HEPA filters are the most efficient air filters commercially available. They are used in cleanrooms and other applications requiring ultra-clean air — semiconductor, electronics, pharmaceutical manufacturing, food processing, hospitals, and labs. Every AstroCel® filter is individually tested before shipment to assure it meets rated efficiency and resistance. AAF HEPA filters are available in a variety of efficiencies - from 99.97% tested on .3 µm particles to ULPA efficiencies up to 99.99995% and higher, tested on .1 to .2 µm particles. All filters are available scan tested.



AstroCel® double-box flange model and particle board cell side construction

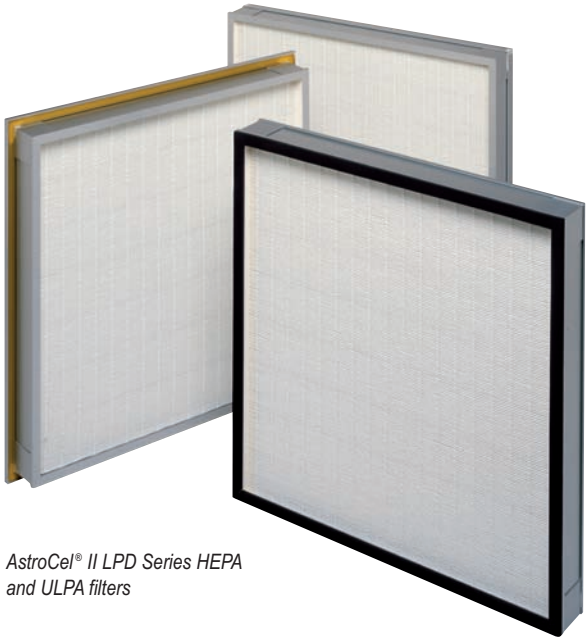
AstroCel® I

AstroCel® I - Designed for 125 FPM (5 7/8" deep) and 250 FPM (11 1/2" deep) filter face velocities at 1.0 in. w.g. initial resistance. Available with a variety of cell side materials, including particle board, plywood, galvanized steel, stainless steel, and aluminum. Gasket seal and gel seal models. Separators are available in corrugated or vinyl coated aluminum. Ultra-fine glass fiber media.

Brochure AFP-1-110

High Capacity AstroCel® I HCX - Designed to handle up to 500 FPM, 2000 CFM (24" x 24" x 11 1/2" size) at 1.4 in. w.g. initial resistance. Cell side materials, separators, and media are the same as AstroCel I. 99.97% and 99.99% efficiencies.

AstroCel® I "CELEBRITY" Series - Economical HEPA filters for negative air remediation equipment and other applications. 1000 and 2000 CFM models. 99.97% efficiency.



AstroCel® II LPD Series HEPA and ULPA filters

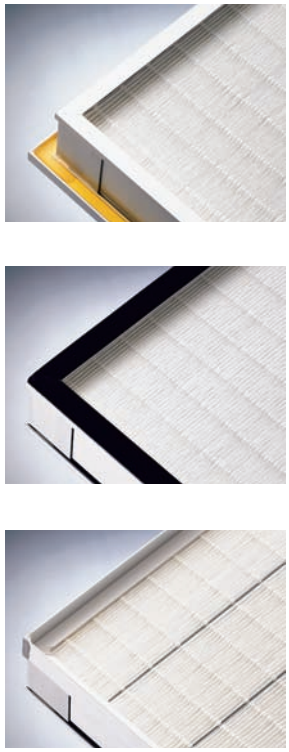
AstroCel® II and MEGAcel™

AstroCel® II LPD Series - Mini-pleat filter design using ribbons of media for separators. Three pleat pack thicknesses accommodate 100 FPM (2" deep), 150 FPM (3" deep) and 200 FPM (4" deep) filter face velocities at 0.52 in. w.g. (or less depending on pack size) initial resistance. Standard cell sides are extruded aluminum. Gasket seal and gel seal models. Ultra-fine glass fiber media.

Brochure AFP-1-404

MEGAcel™ - PTFE membrane filters designed to meet the most stringent cleanroom filtration requirements for fabs, modular, mini, and micro environments.

Brochure AFP-1-402



AstroCel® II (from top) Fluid Seal, Neoprene Gasket, and Knife-Edge

Disposable Ceiling Modules

FM2-LE
Fan/Filter Modules for easy delivery of clean air. Each module utilizes a rugged, energy-efficient AC motorized impeller. It can be used to upgrade an existing cleanroom, or to convert existing space into a cleanroom, without additional ductwork or air handling equipment.
Brochure AFP-1-420

PharmaGel™
HEPA filter module for applications requiring an easily replaceable cartridge without risk of bypass leakage.
Brochure AFP-1-408

TM-2 and TM-4
Light weight, factory sealed hoods for individually ducted, vertical downflow cleanrooms. AAF ceiling filter modules utilize the AstroCel II mini-pleat media pack. The entire module is hermetically sealed at the factory to eliminate leak paths. Extruded aluminum housing.
Brochure AFP-1-475

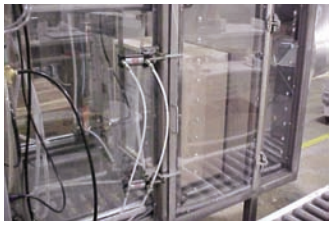
TM-2 and TM-4 filter modules

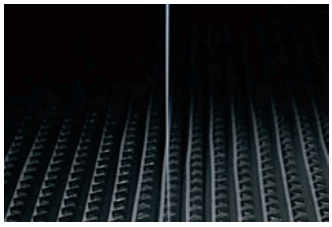
Certified Efficiency

State-of-the-Art Testing

AAF has established an air filtration testing methodology that is among the most comprehensive and accurate in the industry. Testing is essential in documenting filter efficiency, diagnosing problems, and assisting in research and development of filtration products. AAF's testing facilities meet the highest standards for quality control. We perform routine, specialized testing for High Efficiency Particulate Air (HEPA) and Ultra Low Penetration Air (ULPA) filters, to ensure the cleanroom filtration products you receive meet your performance requirements.

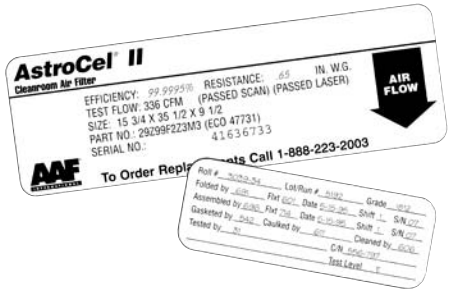
Each HEPA filter is tested and certified to be 99.99% efficient on 0.3 micrometer size particles. Each ULPA filter is tested for efficiency and certified to be 99.9995% efficient on 0.10 to 0.20 micrometer size particles.





Quality and Process Control

Meticulous scrutiny during every phase of the production process enables AAF to trace a filter back to the roll of media from which it was manufactured, should a defect be identified. Each filter is identified by serial and order number and labeled with performance criteria, size information, media lot number, operator number, and part number. This elaborate quality process control ensures that you receive only the highest quality cleanroom filtration products — cost-effective products that meet your toughest requirements.



AAF employs state-of-the-art testing methodology to ensure filter quality.

Gas-Phase Filtration Solutions

Innovations

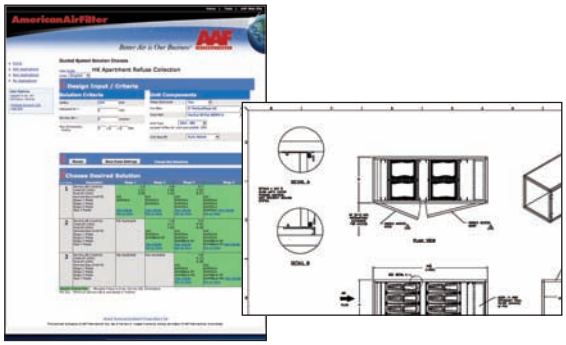
AAF has assumed an industry leading position with the development of its innovative SAAF™ product line designed to reduce or eliminate harmful gaseous contaminants. In combination with our expertise in airborne particulate filtration, SAAF products allow us to develop unique and effective total filtration solutions to protect people, processes, and equipment.

The SAAF product line features these patent-pending solutions:

- Energy-efficient chemical media cassettes that fit our newly designed Side and Front Access Housings. These cassettes also fit in most legacy units. The housings are designed for quiet operation and durability.
- Complete media line - adsorbents, oxidants, and blends configured by and produced under the supervision of our world-class global research and development teams.
- ISA Standard S71.04: Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants and on-site testing to determine the exact nature of the contaminants and their relative concentrations.
- Comprehensive, industry-leading software, SAAF Tech Tools analyzes applications, develops solutions and configures equipment and media, and delivers complete technical proposal.

No other company offers this combination of experience, expertise, innovation, and capability to combat airborne contaminants, particulate and/or gaseous, and deliver the clean air you require.

Brochure GPF-1-100



Select and compare chemical media and equipment solutions using SAAF™ Tech Tools decision-sciences software.

SAAF™ Tech Tools

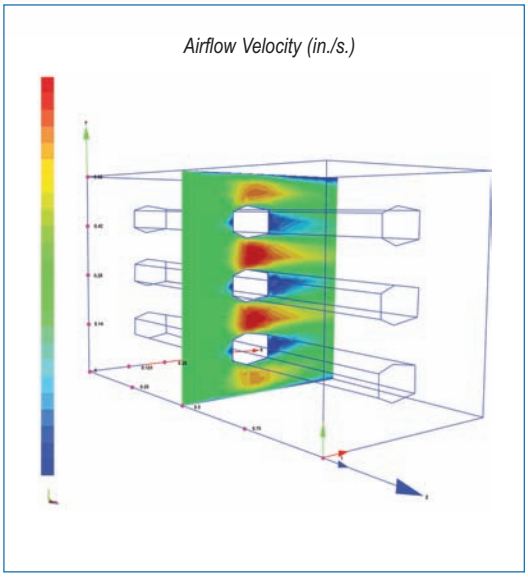
SAAF Tech Tools is the filtration industry's most sophisticated and complete decision-sciences software for configuring clean air solutions to remove airborne gaseous contaminants. SAAF Tech Tools allows the user to select the appropriate chemical media and equipment solutions by entering application specific data or by selecting from a vast library of pre-configured applications and typical concentrations of contaminants. SAAF Tech Tools provides design parameters and technical proposals that include a complete summary report, drawings, sales brochures, installation manuals, specifications, and MSDS sheets. The software is extremely flexible, providing for extensive customization and multiple solutions (if appropriate) to allow the user to configure the exact clean air solution required. All user input can be saved in a personalized library, with a user-designated title and password access protection.

SAAF Tech Tools also offers detailed information on contaminants, adsorbers, oxidants, and provides links to industry information relevant to the user's application and suggested solution.

Engineering Solutions

The Research & Development group is headquartered in Louisville, KY, with staff located in Europe and Asia. Each member of the group is committed to advancing the state-of-the-art in air filtration. R&D's role is to recognize emerging needs and anticipate future air filtration requirements, in order to provide solutions in a timely manner. Their accumulated years of experience, in synergy with a worldwide network of academic and industrial resources, ensure that AAF will always offer excellence in air filtration.

The Product Engineering staff is located in Louisville, KY, and in key manufacturing facilities around the world. They are a team focused on current markets, with an objective of continuous improvement and services to provide maximum value to our customers. They also quickly adapt our products to meet short-term changes in filtration requirements as they arise in the marketplace.



AAF's Computational Fluid Dynamics (CFD) technology is used to observe airflow through a SAAF™ Cassette.

SAAF™ Technical Services

The SAAF Technical Services Group has the instrumentation and training to perform comprehensive evaluations and environmental assessments.

All tests are carried out and correlated to applicable industry standards.

The following evaluations are performed to target specific contaminants and provide recommendations and product solutions:

- Particulate contamination assessments
- Gaseous contaminant assessments
- Humidity assessments
- Product life cycle assessments
- Room integrity verification
- Sealing and HVAC circuit checks


Air Quality Analysis

Installed At:

AQA Number:

Location / Room Name:

Date Installed: Date Removed:

Industrial ☐ Museum/Archive ☐ Cleanroom ☐ CIF ☐

For test report, return test to:
AAF Air Quality Test Laboratories
10300 Ormsby Park Place Suite 600
Louisville, KY 40233-6169 USA

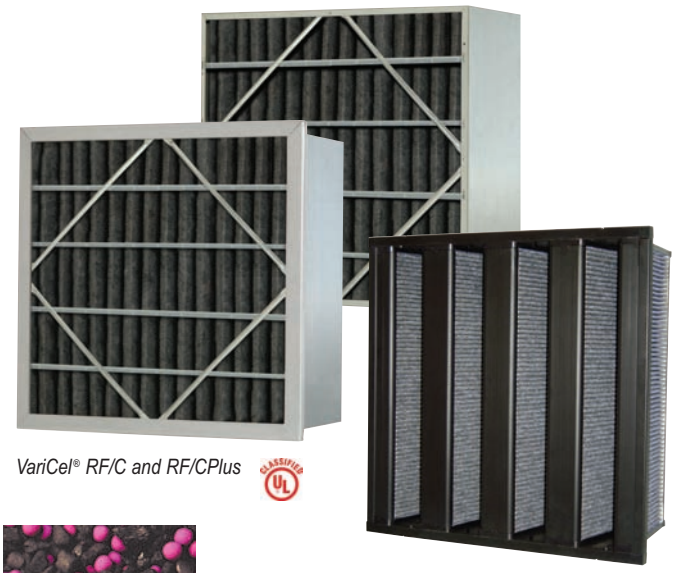
AAF INTERNATIONAL

SAAF Reactivity Monitoring Coupon and Analysis
AAF International offers Environmental Reactivity Coupons to determine the types and levels of molecular contaminants present in the air. AAF's real metal coupons correlate to the ISA Standard, and are a quick and relatively inexpensive environmental AMC determination tool. Coupons pick up AMC contaminants that react with copper and silver. The results are conveyed via a report generated by AAF's Technical Services Team.

SAAF™ Pleated Panel and Extended Surface Filters

AAF makes a variety of pleated and extended surface filters incorporating adsorbents for odor control.

VariCel® RF/C and RF/C*Plus*
Extended-surface, rigid air filters. Constructed with galvanized steel cell sides and plastic pleat spacers on the air-entering and air-leaving sides. High-efficiency filtration for the most demanding applications. Replace existing HVAC filters of the same type with no changes required for frames or latches. Packed in polyethylene to preserve capacity and cleanliness. Available in single-header and no-header models. UL Class 2. MERV 9.
Brochure GPF-1-122

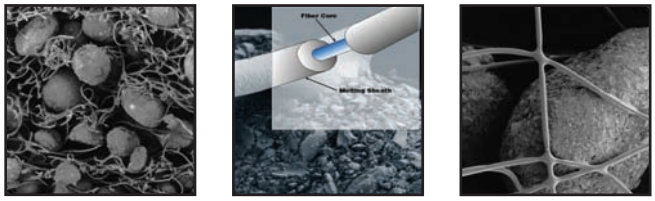


VariCel® RF/C and RF/CPlus

VariCel® RF/C and RF/CPlus filters use CarbonWeb® filter media

VariSorb™ XL delivery system consists of mini-pleat filter elements in high impact polystyrene (HIPS) cell sides for assembly in front, rear, or side-access track systems. The granular microstructure of the media packs ensures a much higher media area to weight ratio resulting in a high spontaneity of reaction. This makes the VariSorb XL very effective at removing medium and low concentrations of gaseous contamination.
Brochure GPF-1-121

VariSorb™ XL



VariSorb™ XL media structure shown above: particle distribution in fiber matrix (left), bi-component fiber bonded to particle (center), and fiber-to-fiber and fiber-to-particle bond (right).

SAAF™ AMC Removal Media and Catalysts

SAAF™ Airborne Molecular Contaminant (AMC) Chemical Media and Catalysts

SAAF AMC chemical media and catalysts provide high-efficiency filtration for effective removal of AMCs encountered in airstreams. This media is easily incorporated into the contaminated airstream by using specific pressure drop-friendly delivery mechanisms. Wide range of media for different target gases. Media can be analyzed for precise remaining life analysis calculations. Powerful enough for high capacity industrial applications, yet suitable in mission critical applications. Easy disposal.
Brochure GPF-1-103

SAAF™ Delivery Systems for Airborne Molecular Containment (AMC) Chemical Media and Catalysts

SAAF chemical media delivery mechanisms include SAAF deep-bed type systems, cassettes, cartridges, multiple-panel V-banks, pleated filters, and mini-pleat high-efficiency gas removal filters. AMC delivery mechanisms can be easily incorporated into existing HVAC systems. Pressure drop-friendly and fail-safe delivery mechanisms hold SAAF AMC chemical media.

SAAF™ Cassettes, Cartridges, and Replacement Panels
SAAF cassettes, cartridges, and replacement panels are available across a complete range of pressure drop and removal efficiencies. Built to high tolerances, SAAF cassettes reduce "dirty-air" bypass because of better sealing within filtration systems. Easy replacement for existing panel-type filters common in HVAC systems. Provide enhanced technology for retrofit upgrades. Patented filtration technologies extend life of SAAF replacements.
Brochures GPF-1-108, GPF-1-109, and GPF-1-111

SAAF™ Cassette CG

SAAF™ Front Access Housings

SAAF Front Access Housings (SAAF:FAH) are easy to retrofit and incorporate within existing AHUs. Sturdy construction. Built to high tolerances, thereby reducing bypass due to better sealing within the filtration system. House refillable panels and cassette inserts. Patented filtration technologies extend life of SAAF replacements.
Brochure GPF-1-115

SAAF™ Front Access Housings

SAAF™ Side Access Housings

SAAF Side Access Housings (SAAF:SAH) are designed to support chemical media cassettes, prefilters and after-filters, and high efficiency particulate filters in one self-contained unit for the removal of gas contaminants and airborne particulate. Housings offer the advantages of a conventional side access housing and maximum flexibility in the selection of chemical media and gas-phase filter elements to remove contaminants from the air.
Brochure GPF-1-106

SAAF™ Side Access Housing

AmericanAirFilter®

Cleanroom Particulate and Gas-Phase Products and Systems

Customer Service

Put the AAF Cleanroom Team To Work for You

Industry experience, engineering expertise, extensive product line, worldwide manufacturing capability, and an uncompromised commitment to quality define AAF International. But what really places us ahead of the competition is our willingness to work with our customers. We tackle the tough, one-of-a-kind projects. We are willing to meet the most stringent specifications and develop systems and products that do the job.

With a commitment to customer service; the strength and resources to support your most critical requirements; and the quality of our existing customer installations to build on, AAF International is well positioned to meet our cleanroom customers' needs worldwide, now and in the future.

Customer Support When You Need It

Our cleanroom team is staffed by professionals ready to go to work for you. Construction and certification are key phases of a cleanroom project. On our team are specialists, with years of experience in the cleanroom industry. They are available for consultation when problems arise, or at any time their expertise and advice is needed. We are always there to help provide the best conditions for the operation and maintenance of your cleanroom.

Our systems and products are designed for a long operating cycle. Reliability can be guaranteed, if you use original AAF parts and filter elements. New filter elements and parts can be ordered from us, or any of our affiliated companies.

AAF Service and Manufacturing Locations

Corporate Headquarters

Louisville, Kentucky

AAF SuperCenters

Dallas, Texas
Doraville, Georgia
Elizabethtown, Pennsylvania
Lebanon, Indiana
Ontario, California

Fiberglass Products Manufacturing

Fayetteville, Arkansas

High Purity Products Manufacturing

Columbia, Missouri

Wholesale Products Manufacturing

Norcross, Georgia

AAF INTERNATIONAL® *Better Air is Our Business®*

10300 Ormsby Park Place Suite 600
Louisville, Kentucky 40223-6169
www.aafintl.com

Customer Service 877.228.7007
Fax 877.228.8008

ISO Certified 9001:2000

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

AFP-1-400D AUG '07 MP 15M