

THE WORLD LEADER IN CLEAN AIR SOLUTIONS



Commercial Buildings Clean Air Solutions

PARTICULATE AND GASEOUS FILTRATION



Controlling Airborne Pollutants in Commercial Buildings

Clean Air Solutions for Commercial Facilities

Around the globe, AAF is meeting the need for clean air in commercial facilities, such as hospitals, schools, airports, museums, financial institutions, hotels, and shopping malls. From inexpensive disposable panel filters to high-efficiency, extended surface filters with antimicrobial and gas-phase filtration, we market the widest range of air filtration products available.

Critical Importance of Indoor Air Quality (IAQ)

In commercial facilities, controlling airborne pollutants is necessary to maintain a comfortable, healthy, and odor-free environment. In many commercial buildings, IAQ is a primary concern. The pollution levels in this indoor air can be up to five times higher than outdoor levels, and poor IAQ ranks as one of the top five environmental risks to public health. While the majority of commercial facilities use common particulate filters, these filters cannot resolve all problems related to poor air quality. In addition, gas-phase filtration must be used to control the harmful effects of gaseous contaminants.

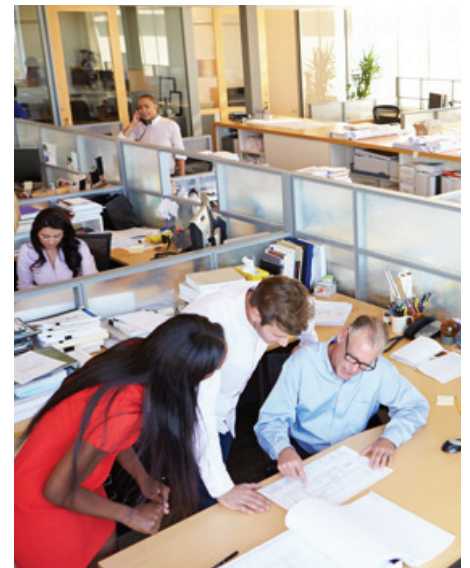
Gaseous contaminants originate from a variety of sources, such as automotive exhaust and chemical offgassing of new furnishings. Commercial facilities face a unique challenge in combating gases from various occupant activities, building operating equipment, and maintenance areas, as well as airborne particulate from renovations and construction. The hustle and bustle in gymnasiums, science classes, and cafeterias pose some of the biggest challenges for educational facilities.

Jet fuel emissions pose a threat to protecting patrons and workers in airport terminals, control towers, and transportation areas. Museums and historic storage areas are susceptible to chemicals in the air, especially gases of an acidic nature that can damage precious works of art and historic significance. Clean air is vital to healthcare facility operations, in order to protect patients, staff, and visitors from potential airborne diseases and infections, and to protect occupants from chemical odors resulting from laboratories, morgues, and other areas within the facility.

AAF can custom design commercial air filtration products to meet the most demanding airflow and efficiency requirements.



AAF filters are at work in Reliant Stadium in Houston, Texas, USA.



Our air filtration team understands that the requirements for commercial facilities differ for each application. Our experience in developing air filtration products for a variety of industries gives us the know-how to tackle any project.

Clean Air Technology



AAF has joined with leaders from every sector of the building industry to promote buildings that are environmentally responsible, profitable, and healthy places to live and work.

Optimize Your Environment

Air filtration systems in commercial facilities must handle relatively large volumes of air.

Approximately 50% of a building's energy consumption goes to the heating, cooling, and moving of air. Proper filter selection and maintenance is essential to keeping HVAC systems operating effectively and efficiently. There are multiple facets of the filter and the system it's installed in that must be taken into consideration. These considerations include system airspeed, fan efficiency, filter resistance, service life, efficiency and cost.

In considering the Total Cost of Ownership (TCO), it is important to keep in mind that in order to have a cost-effective building, planning maintenance is an important step in maintaining energy efficiency, minimizing costly downtime, and extending the lifespan of your equipment.

Comprehensive Purchase Perspective

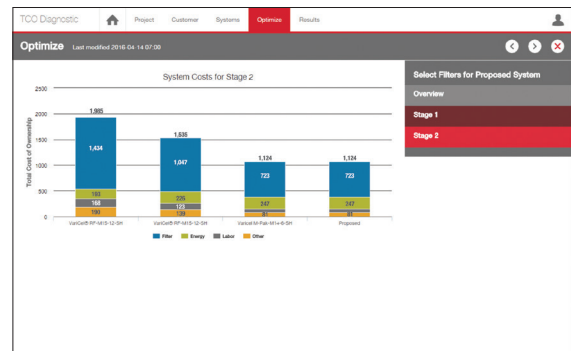
Selecting the proper filtration for your HVAC system can help your commercial facility to reduce spend, decrease risk, and save time. Commercial facilities need the support of a trusted advisor who can perform Air Filtration Audits and Diagnostics to ensure that the most optimal effective solution is selected and installed in their air filtration systems.

TCO Diagnostic®

A thorough air filter audit of your HVAC Systems is the first step that AAF takes in order to provide you with professional guidance and analysis for cost savings and risk reduction. By conducting this audit, we will be able to understand your current state and then utilize TCO Diagnostic®, an advanced analytical software tool, to identify how you can perform even better.

The purpose of TCO Diagnostic is to assist you in selecting the best filters for your air handling systems and to understand their sensitivity to your operating conditions, in order to operate your system in the most optimal and effective manner.

TCO Diagnostic provides the insight to identify improvement opportunities, find the optimized options and tailor to your specific needs for a comprehensive purchase perspective—improving air quality, energy savings, and operational flexibility while reducing total cost of ownership.



Green Buildings Solutions



Air Filtration Strategies Earn Credits toward Green Building Certification

Green building, or sustainable building, is the practice of designing and constructing a building to use resources, including energy and water, more efficiently throughout its life cycle, from siting, design, and construction to operation, maintenance, renovation, and deconstruction. Green building, which reduces a building's impact on human health and the environment, enables building owners and operators to be socially responsible and results in lower operating costs.

Many commercial buildings are seeking to assess sustainability through certification by the Building Research Establishment Environmental Assessment Method (BREEAM). The longest established and leading method of assessing, rating, and certifying building sustainability, BREEAM sets the benchmark for green building in 78 countries around the world.

Assessments are based on technical standards established for various types of developments, including new construction buildings, in-use buildings, and refurbishment and fit-out buildings. Air filtration strategies contribute to earning credits toward accreditation in seven of the 10 categories used by BREEAM to measure sustainable value:

- Energy – measures to improve the inherent energy efficiency of the building, encourage the reduction of carbon emissions, and support efficient management throughout the operational phase of the building's life
- Health and Wellbeing – encouragement of a healthy and safe internal and external environment for occupants
- Innovation – exemplary performance and innovation which go beyond the requirements of the credit criteria, including innovative products and processes

- Materials – procurement of materials that are sourced in a responsible way and have a low embodied impact over their life, including extraction, processing and manufacturing, and recycling
- Management – adoption of sustainable management processes in connection with design, construction, commissioning, handover, and aftercare activities to ensure that robust sustainability objectives are set and followed through into the operation of the building
- Pollution – reduction of the building's impact on surrounding communities and environment arising from light-pollution, noise, flooding, and emissions to air, land, and water
- Waste – reduction of the waste arising from the construction and operation of the building, encouraging its diversion from landfill

Air filtration strategies also contribute to earning credits toward certification by Leadership in Energy and Environmental Design® (LEED®). Administered by the U.S. Green Building Council, the LEED® Green Building Rating System™, which has previously been used primarily in the U.S., is now being used around the world to assess the environmental performance of buildings.

AAF Flanders, the worldwide leader in air filtration solutions, designs and manufactures all of our products to meet the highest standards of performance reliability, efficiency, and sustainability. With regard to Indoor Air Quality (IAQ), we use LEED®'s assessment criteria, which is the most stringent, as our performance benchmark.

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 TCO Diagnostic SM 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 using TCO Diagnostic, 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	Determine the appropriate changeout cycle for filters by using 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 changeouts 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 rooms. 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 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 TCO Diagnostic SM analysis 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 TCO Diagnostic 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 using TCO Diagnostic, 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)	Determine the appropriate changeout cycle for filters by using 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 changeout 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.

Particulate Filtration Solutions

Pleated Panel Filters

The AAF pleated panel filter line provides the industry's broadest selection of high performance, high capacity filters, including specialty and standard capacity options. This enhanced line of filters offers consistent air quality, improved process performance, social responsibility, and optimized Total Cost of Ownership.

Pleated filters can be used as prefilters to protect and extend the life of higher efficiency, more expensive final filters. In many applications, they are the only filter used in an HVAC system.



The Pleated Panel Filter line features:

- Filter classes G2–M5 (EN779:2012)
- ISO coarse to ePM10 (ISO 16890)
- Industry's lowest life cycle pressure drop and highest Dust Holding Capacity (DHC) reduces energy consumption and total operating costs
- Highest performing self-supported pleated filter on the market
- High efficiency pleated filter supports achievement of LEED® credits by significantly improving Indoor Air Quality (IAQ) and reducing energy consumption
- Economy grade filter selections for medium to light duty applications
- Filter options for high temperature and high velocity environments



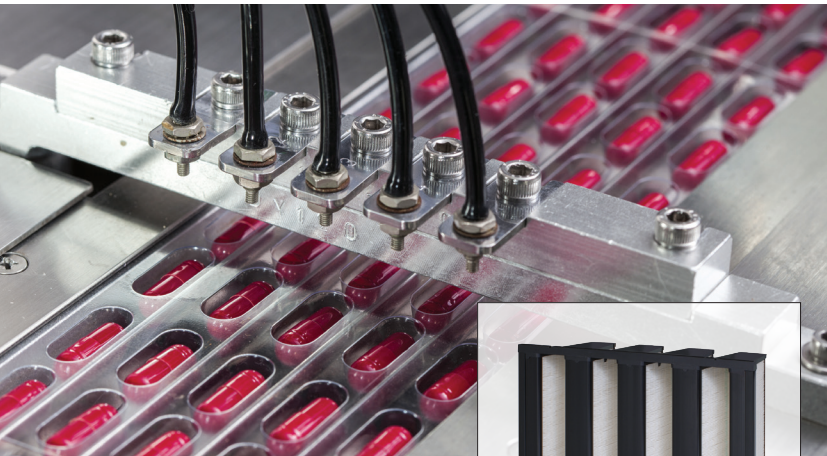
High Efficiency Extended Surface Filters

These rigid, extended surface filters are ideal for use in all high efficiency applications. The supported pleat filters provide strength and integrity in high flow, turbulent, and variable airflow conditions.

These filters are designed to remove airborne biological contaminants in critical areas, such as hospitals and pharmaceutical processing.

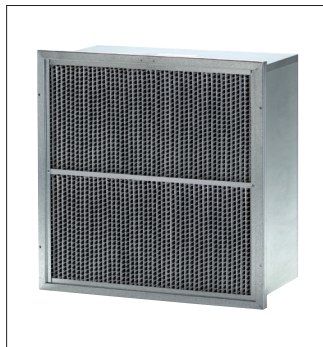
Extended Surface Non-Supported Pocket Filters

Non-supported pocket filters are the most economical, high-efficiency filters available, and an excellent choice for healthcare facilities, automotive paint booths, commercial buildings, and various industrial applications. Designed for high performance in demanding operating conditions, AAF extended surface pocket filters are perfect as both prefilters and final filters for particulate removal where clean air is required.



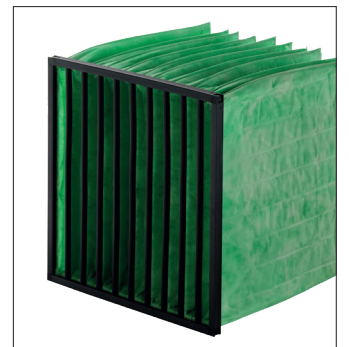
The High Efficiency Extended Surface Filter line features:

- Filter classes M6–EN10 (EN779:2012)
- ISO coarse to ePM2,5 to ePM1 (ISO 16890)
- Patented Impress® Technology delivers a higher DHC and a lower pressure drop for greater energy efficiency
- Heavy-duty construction and high performance in tough operating conditions
- Dual density media increases DHC and reduces operating costs
- 100% separatorless and self-supporting microglass filters for easy disposal
- Inline space-saving designs for high efficiency without having to compromise space



The Extended Surface Non-Supported Pocket Filter line features:

- Filter classes M5–F9 (EN779:2012)
- ISO ePM10, ePM2,5 and ePM1 (ISO 16890)
- Patented pocket design for minimum resistance, maximum DHC, and significantly longer filter life
- Industry leading functionality to optimize your HVAC system's performance
- Best-in-class performance for energy efficiency and ease of installation
- High-loft, layered meltblown synthetic media improves performance



Particulate Filtration Solutions

HEPA/ULPA Filters

HEPA filters are the most efficient air filters commercially available. They are used in cleanroom and other applications requiring ultra-clean air—semiconductor, electronics, pharmaceutical manufacturing, food processing, hospitals, and labs. AAF HEPA filters are individually tested before shipment to ensure they meet rated efficiency and resistance. AAF HEPA and ULPA filters are available in a variety of efficiencies—from 99.97% tested on $.3 \mu\text{m}$ particles to 99.9995% and higher tested on $.1$ to $.2 \mu\text{m}$ particles. All filters are available scan-tested.

The HEPA/ULPA Filter line features:



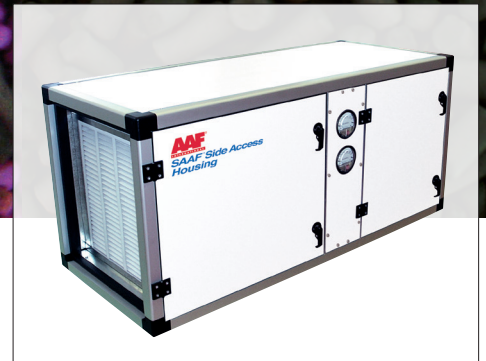
- Filter classes E10–U17 (EN779:2012; EN1822:2009)
- Designed to meet the demanding airflow and efficiency requirements of the most critical applications
- Patented pending, high performing ePTFE Filtration Technology—designed specifically for the unique challenges of the pharmaceutical industry
- Chemical-resistant capabilities for highly corrosive environments
- Available as a separatorless media filter with a self-supporting media pack
- High capacity, space saving designs
- Filters designed specifically for high airflow applications requiring HEPA efficiency at an ultra low pressure drop



Gaseous Filtration Solutions

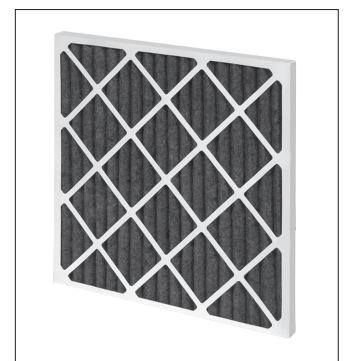
AAF has assumed an industry leading position with the development of its innovative SAAF (pronounced as "SAFE") product line designed to reduce or eliminate harmful gaseous contaminants. In combination with our expertise in airborne particulate filtration, SAAF products and solutions allow us to develop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

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



The SAAF product line features:

- Patented chemical media cassettes with superior sealing and energy savings. These cassettes also fit in most legacy units. The housings are designed for quiet operation and durability
- Complete chemical media line – adsorbents, oxidants, and blends configured by and produced under the supervision of our world-class global research and development teams
- Environmental Measurements related to the ISA Standard S71.04: "Environmental Conditions for Process Measurement and Control Systems. Airborne Contaminants to determine types of contaminants and their relative concentrations"
- RoHS compliant Corrosion Control
- Comprehensive, industry leading software – SAAF Tech Tools analyzes applications, develops solutions, configures equipment and media, and delivers a complete technical proposal
- Full line of gas-phase equipment, including side access housings, air purification systems and machine intake filter systems



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