



AmericanAirFilter®
AstroCel® I



*High Efficiency Particulate
Air Filters (HEPA)*

*Ultra Low Penetration
Air Filters (ULPA)*

Available with Antimicrobial

Better Air is Our Business® **AAFI[®]**
INTERNATIONAL

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

Available with Antimicrobial

HEPA and ULPA filters are the most efficient air filters commercially available. Originally developed for the U.S. Atomic Energy Commission, they have broad application in cleanrooms and other areas requiring the very highest levels of contamination control:

- **Semiconductor manufacturing**
- **Electronics**
- **Pharmaceutical processing**
- **Nuclear power stations**
- **Department of Defense installations**
- **Department of Energy installations**
- **Photo film manufacturing/processing**
- **Hospitals**
- **Laboratories**
- **Food processing**
- **Asbestos abatement**

AAF HEPA and ULPA filters feature a broader selection of efficiencies, cell side materials and configurations, and separator designs and bonds than any other manufacturer.

AstroCel I filters are available to meet all performance classes per the Institute of Environmental Sciences & Technology IEST RP-1 including:

Type A

Minimum efficiency of 99.97% on 0.3 μm at rated flow.

Type B

Minimum efficiency of 99.97% on 0.3 μm at 100% and 20% of rated flow.

Type C

Minimum efficiency of 99.99% on 0.3 μm and scan tested.

Type D

Minimum efficiency of 99.999% on 0.3 μm and scan tested.

Type E

Constructed and tested in accordance with ASME AG-1, Section FC.

Type F

Minimum efficiency of 99.999% on 0.1 to 0.2 μm and scan tested.



AstroCel® I filters meet efficiency requirements established for LEED® Project Certification.

AstroCel I filters with antimicrobial are designed specifically to improve Indoor Air Quality (IAQ). Air filters are designed to trap and concentrate particulate air contaminants including viable fungal and bacterial spores. The presence of antimicrobial in the filter media is intended to preserve the integrity of the media throughout the useful life of the filter. Antimicrobial preservatives are not meant to increase the efficiency of the filter, nor to kill microorganisms “on the fly” as they pass through a filter.

Guaranteed Performance

Every AstroCel I filter is individually tested before it leaves the factory — your assurance that it meets rated efficiency. The actual test data is indicated on the label. Each filter is also assigned a serial number and a permanent record is kept of the materials of construction and performance.

Test results on each filter are indicated on the label.



Manufactured to the Highest Quality Standards



Standard Capacity

5⁷/₈" deep – 150 FPM @ 1.0 in. w.g.

11¹/₂" deep – 260 FPM @ 1.0 in. w.g.

HEPA Efficiencies - 99.97% and 99.99% minimum efficiency on 0.3 micrometer particles.

ULPA Efficiency - 99.999% minimum efficiency of 0.3 micrometer particles and 99.9995% on 0.1 to 0.2 micrometer particles (11¹/₂" deep only). For ULPA and MEGA efficiencies up to 99.999995% on 0.10 to 0.20 micrometer particles, use AstroCel II LPD Series minipleat filters.



High Capacity

24" x 24" x 11¹/₂" deep - 2000 CFM @ 1.4 in. w.g.

HEPA Efficiencies - 99.97% and 99.99% minimum efficiency on 0.3 micrometer particles.

Selected nuclear grade AstroCel I filters have been qualified by the Department of the Army in accordance with ASME AG-1. They are used in critical applications such as the Department of Energy and nuclear power plants. The qualification tests subject the filters to a series of rigorous environmental conditions and must meet rated efficiency.

Underwriters' Laboratories Classifications



UL Class 1

AstroCel I filters are classified UL Class I by Standard 900 (except those made with non-fire retardant wood cell sides).

UL 586

This standard ensures that each filter is individually tested at the factory. Additionally, representative filters are tested by UL to ensure that they provide HEPA level filtration, after being subjected to the following conditions:

- **High moisture (90% R.H.)**
- **High temperature (700°F/371°C)**
- **Low temperature (27°F/-3°C)**

UL also subjects the filter to a spot flame test (1750°F/954°C). A numbered UL label certifying that the filter meets Standard 586 can be applied to the filter.

Media Testing to Meet Exacting Quality Standards

Every roll of media is carefully checked for a specific set of physical and performance characteristics, including:

- **Efficiency**
- **Resistance**
- **Thickness**
- **Weight**
- **Tensile Strength**
- **Binder Content**
- **Water Repellency**

Scan Testing

Leak Testing

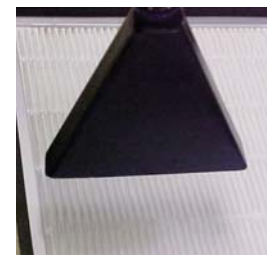
Filters that pass the overall efficiency test may still have minute pinhole leaks. AstroCel I filters can be factory scanned to assure there are no pinhole leaks. Scanning detects these leaks which are repaired before the filter is released for shipment.

AAF uses a proprietary static scan test with a challenge aerosol of non-toxic, polyfunctional alcohol that leaves no residue on the media.

For pharmaceutical and those applications requiring PAO, AAF offers scanning with this material using a light scattering photometer.



Scan test showing leak indicated by a smoke trail.



Scanning with light scattering photometer.

Overall Efficiency Testing

Two methods of overall efficiency testing used:

PAO Test

This has been the industry standard for many years. It is conducted using a forward light scattering photometer. The filter is challenged with poly-alpha-olefin (PAO). By measuring the upstream and downstream concentration, the filter efficiency can be calculated.

Laser Test

The filter is tested with a laser spectrometer using polystyrene latex (PSL) spheres. Filter efficiency is determined by comparing the upstream and downstream concentrations. Efficiencies down to 0.10 micrometers can be determined.



AAF laser spectrometer.

AstroCel I filters are available in a variety of construction materials and cell side configurations to fit AAF and competitive framing systems or sealing designs. Refer to the section on selection data for a complete list of cell side materials.

Gasketed Filters



For installation in high integrity filter holding frames, replaceable cartridge ceiling modules, side access housings, and Bag In/Bag Out systems.

Special Construction AstroCel® I Filters



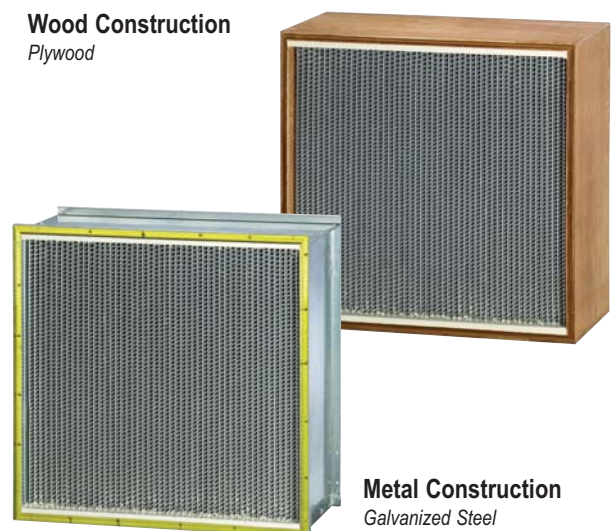
High Temperature Applications
AstroCel I filters made with stainless steel or aluminum cell sides are available for applications with continuous operating temperatures up to 750°F.

400°F (204°C) — Stainless Steel or Aluminum Cell Sides, White RTV Silicone Bond

500°F (260°C) — Stainless Steel or Aluminum Cell Sides, Red RTV Silicone Bond

750°F (399°C) — Stainless Steel Cell Sides, Black Cement Bond

Gel Seal Filters



For installation in AAF and competitive knife-edge gel seal framing systems, side access housings, or Bag In/Bag Out units. The channel around the perimeter of the filter is filled with AAF PermaGel™ (silicone sealant that will not dry out or crack over years of service life).

Filters for Bag-In/Bag-Out systems are available with extractor clips.

AstroCel I Side Access Filters

AstroCel I filters are constructed with a flange at the top and bottom for installation into earlier models of AstroSeal side access housings. The filters are available with wood or metal cell sides.



Military and Nuclear Designs

AstroCel I filters are available to comply with military and nuclear specifications (ASME AG-1) requiring special cell side material, radiation resistant media, rabbeted joints, special testing, and special packaging and marking.

Bond

The media pack is thoroughly sealed to the inside of the cell sides with a variety of adhesives that prevent bypass leakage around the pack. The sealant totally encapsulates the media edges, closing off all leak paths.

Close-up photo shows how the polyurethane bond, standard on most AstroCel I filters, encapsulates the pack, eliminating voids.



Separators

Pleat spacing is precisely maintained by corrugated aluminum separators that permit maximum usage of the media at minimum resistance. For corrosive environments, vinyl coated separators are available.

Rolled edge separators are used to minimize the risk of media damage.

Media

AstroCel I filter media is made from sub-micron glass fibers formed into a high density paper. Continuous sheets are pleated to provide a high ratio of media area to face area, resulting in low media velocity, which is essential for ultra-high efficiency filtration. AstroCel I filter media is waterproof and fire retardant to 1000°F (538°C). A radiation resistant media is also available (for nuclear applications).

Gel Seal

Gel seal filters contain AAF PermaGel silicone gel sealant.

Gaskets

Standard closed cell neoprene rubber gaskets are available to provide an airtight seal and prevent leakage past the filter. Gaskets are $\frac{3}{4}$ " wide by $\frac{1}{4}$ " thick. Silicone and urethane gaskets are also available.

Cell Sides

Wood

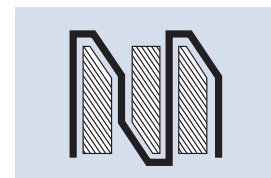
$\frac{3}{4}$ " particle board is typically used. Butt joined edges are glued and stapled to assure a strong corner joint. Plywood is also available.

Metal*

A variety of metals are available including plated steels, stainless steel, and aluminum.

Wedge Shaped Pleats

The 180° turn, forming each pleat of media on both sides of the filter, is wedge shaped. The media is double scored to form a box fold around the flattened ends of the separators. The uniform fit of the wedge shaped box fold pleats prevents media damage. Single score or rolled media pleating used in some competitive filters increases the risk of media damage caused by the sharp pointed crests of the corrugated separators puncturing the media.



**Available with antimicrobial treated media.*

AstroCel® I Selection

AstroCel I filters are available in a wide variety of standard sizes and construction materials. Special sizes can be fabricated or special materials used for unique requirements.

There are twelve criteria encompassing materials and performance that go into the makeup of an AstroCel I filter. Careful selection of the right combination will result in the filter that best meets the needs of your application.

Size

40 standard sizes from 8" x 8" to 36" x 72".

AstroCel I filter sizes are listed with the height dimension first, followed by the width, then depth.

Minimum Efficiency

99.97% — 0.3µm (HEPA)
99.99% — 0.3µm (HEPA)
99.999% — 0.3µm (ULPA)
99.9995% — 0.10 to 0.20µm (ULPA)

Scan Tested (Optional)

AstroCel I filters can be scan tested to eliminate pinhole leaks.

Media

(Available with antimicrobial)
Waterproof, fire retardant fiberglass.
Waterproof, fire retardant, radiation resistant fiberglass.

Cell Side Material

Plywood
Fire Retardant Plywood
Particle Board
Fire Retardant Particle Board
*Galvanized Steel
*Stainless Steel
*Aluminum

Separators

Aluminum
Vinyl Coated Aluminum

Bond

Polyurethane Elastomer
Silicone
Black Cement

Gasket

Neoprene Expanded Rubber
Silicone
Urethane

Gasket Location

None
One Side
Both Sides

Faceguards (Optional)

4 x 4 Mesh Hardware Cloth
Galvanized Steel
Stainless Steel

Faceguard Location

None
One Side
Both Sides

UL 586 Classified (Optional)

Numbered UL certification label to be applied.

**Available with antimicrobial treated media.*

AstroCel® I HCX

High Capacity

High Capacity AstroCel I HCX filters are designed to handle higher airflow than the corresponding sizes of standard AstroCel I filters. This offers greater operating flexibility and cost savings.

- **Higher airflow with the same resistance**
- **Higher airflow (up to 2000 CFM for a 24" x 24" x 11½" filter, with slightly higher initial resistance)**
- **Lower resistance, lower energy cost, and substantially longer life at the same rate of flow compared to standard HEPA filters**
- **Available with antimicrobial treated media**

Sizes

All standard and special sizes, 11½" deep only.

Efficiencies

99.97% and 99.99% minimum, 0.3 µm.

Cell Side Materials, Bonds, Separators, Gaskets

Same as standard AstroCel I filters.

AstroCel I HCX filters can be classified according to UL Standard 586. They are also classified UL Class 1 by Standard 900 (except those made with non-fire retardant wood cell sides).

*Up to 2000 CFM
(24" x 24" x 11½" size).*



Shallow crimp separators.

Save on New AstroCel® I HCX Filter Installations

- Fewer filters required.
- Less space required for filter bank.
- No transitions.
- Faster installation.

Save on Replacements and Operating Costs in Existing Systems

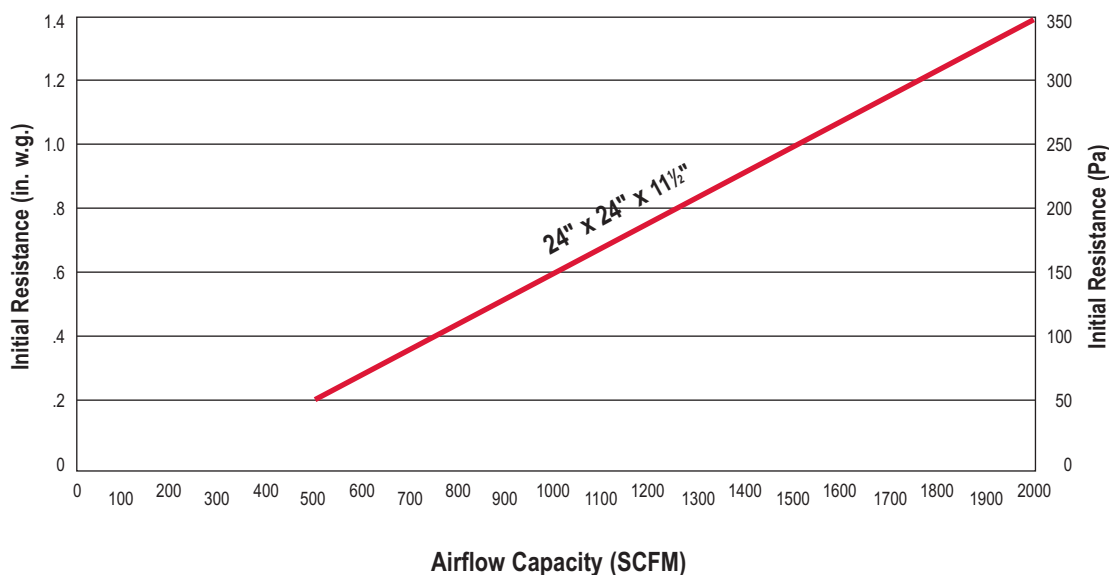
- When operated at 1000 CFM, the filters last approximately twice as long as standard HEPA filters.
- Lower energy cost.
- Less frequent change-out saves on labor and disposal costs.

Shallow Crimp Separators Permit More Media

Increased airflow capacity is the result of shallow crimp separators that have a lower profile (shorter height) compared to standard HEPA filters. This permits more pleats and, as a result, more media.

Operating Comparison	Standard AstroCel I 24" x 24" x 11½"	High Capacity AstroCel I HCX 24" x 24" x 11½"
Rated Airflow Capacity @ 1.4 in. w.g. (350 Pa) initial resistance	1450 CFM (2465 m³/hr.)	2000 CFM (3400 m³/hr.)
Rated Airflow Capacity @ 1.0 in. w.g. (250 Pa) initial resistance	1050 CFM (1785 m³/hr.)	1500 CFM (2550 m³/hr.)
Service Life Ratio @ 1000 CFM (1700 m³/hr.)	1.0	2.0

HCX Initial Resistance vs Airflow Capacity



AstroCel® I HCX filters are non-directional and may be installed with the airflow in either direction. The arrow on the label indicates the direction of airflow during factory testing.

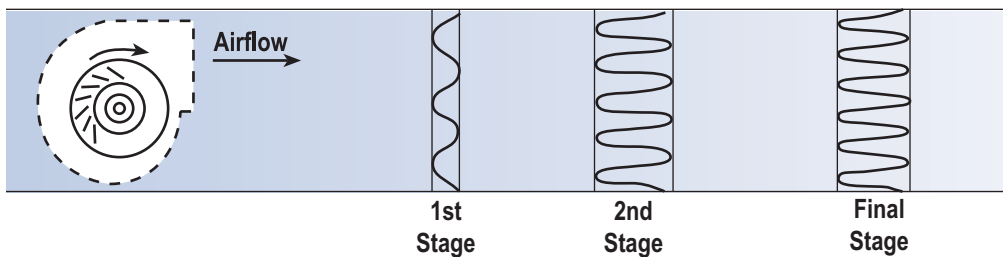
Extend AstroCel® I Life with Prefilters

No HEPA filter installation should ever be operated without prefilters. AAF has a broader selection of prefilters than any other manufacturer – from roughing filters, to automatic roll filters, to pleated filters, to extended surface filters. AAF strongly recommends two stages of prefilters in front of HEPA filter installations.

AAF tests have shown that prefilters greatly extend the life of HEPA filters. The higher the efficiency of the prefilters, the longer the life of the AstroCel I filters. MERV 15 filters can extend HEPA filter life nearly nine times.

Prefilter	Life Extension of AstroCel I
2" Disposable Panel Filter	26%
Extended Surface Filters	
MERV 7	35%
MERV 11	170%
MERV 13	520%
MERV 15	880%

Typical Three Stage HEPA Filter Installation



1st Stage Prefilter	2nd Stage Prefilter	Final Stage HEPA Filter
Select from:	Select from:	Select from:
PerfectPleat® (MERV 7)	*VariCel®	*AstroCel I
PerfectPleat SC M8 (MERV 8)	*VariCel II	*AstroCel I HCX
PerfectPleat HC M8 (MERV 8)	*VariCel II MH	(99.97 - 99.9995%)
PerfectPleat ULTRA (MERV 8)	*VariCel M-Pak	
	*VariCel V	
	*VariCel VXL	
	*(MERV 11-15)	

*Available with antimicrobial.

PerfectPleat® is a registered trademark of AAF-McQuay Inc. in Canada and the U.S.
AAF Green® is a registered trademark of AAF-McQuay Inc. in the U.S.