AstroCel® I

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

Available with Intersept®

BETTER AIR IS OUR BUSINESS®

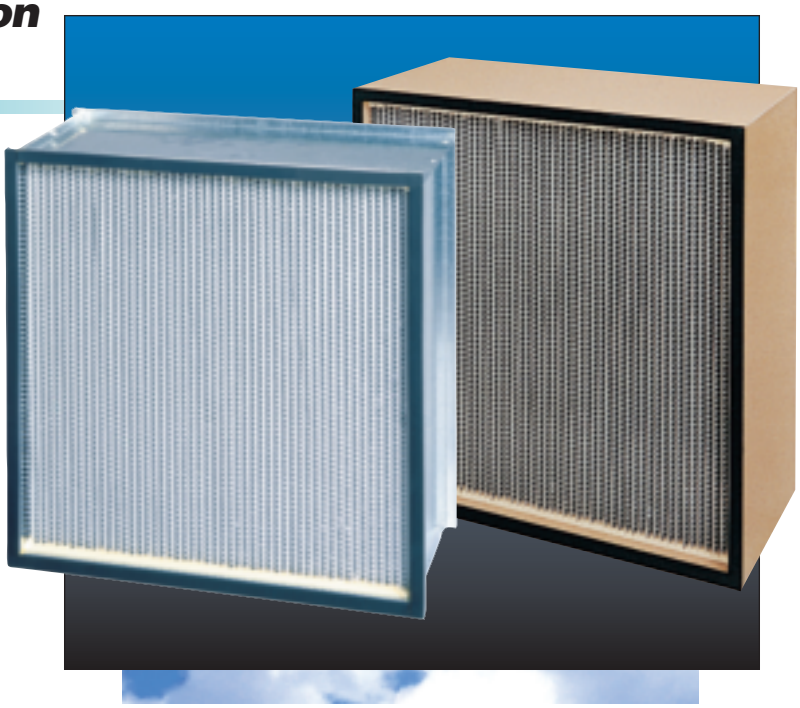
AAF® INTERNATIONAL

AAF AstroCel® I

The Industry's Widest Selection of HEPA and ULPA Filters

HEPA and ULPA filters are the most efficient air filters commercially available. Originally developed for the Atomic Energy Commission, they have broad application in clean-rooms 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***



AstroCel® I filters are available with Intersept® in 99.99% efficiency with metal cell sides. Contact your AAF IAQ specialist for information on special orders.

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

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

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 MIL-F-51477 or MIL-F-51068.

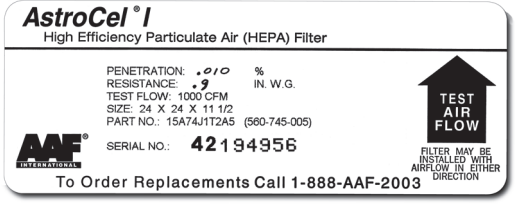
Type F – Minimum efficiency of 99.999% on 0.1 to 0.2 µm and scan tested.

AstroCel® I filters with Intersept® 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 Intersept® antimicrobial in the filter media is intended to preserve the integrity of the media throughout the useful life of the filter. Intersept® is EPA registered and environmentally safe.

GUARANTEED PERFORMANCE

Every AstroCel filter is individually tested before it leaves the factory – your assurance that it meets rated efficiency. The penetration and actual resistance at test airflow rate are 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

5⅞" deep – 150 FPM @ 1.0" wg.
11½" deep – 260 FPM @ 1.0" wg.

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 (11½ deep only). For ULPA and MEGA efficiencies up to 99.999995% on .10 to .20 micrometer particles, use AstroCel II LPD Series minipleat filters.

High Capacity

11½" deep - 500 FPM @ 1.4 wg.

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

Selected nuclear grade AstroCel filters have been qualified by the Department of the Army for inclusion in the Qualified Products List (QPL). They are used in critical applications such as the Department of Energy and nuclear power plants. To qualify for the QPL, the filters are subjected to a series of rigorous environmental conditions and must meet rated efficiency. Very few manufacturers' HEPA filters are QPL qualified.

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 (maximum size 24" x 30").

MEDIA TESTING TO MEET EXACTING QUALITY STANDARDS

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

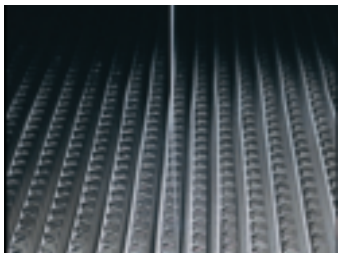
- ***Efficiency***
- ***Thickness***
- ***Tensile Strength***
- ***Water Repellency***
- ***Resistance***
- ***Weight***
- ***Binder Content***

SCAN TESTING

Leak Testing – Filters that pass the overall efficiency test may still have minute pinhole leaks. AstroCel 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 DOP or PAO, AAF offers scanning with these materials using a light scattering photometer.



Scan test showing leak indicated by a smoke trail.

Light scattering photometer.

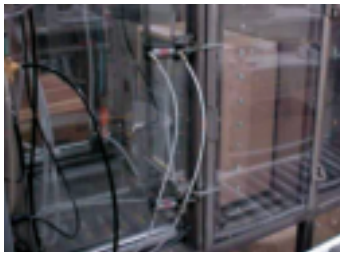
OVERALL EFFICIENCY TESTING

Two methods of overall efficiency testing used

DOP Test – This has been the industry standard for many years. It is conducted using a forward light scattering photometer. The filter is challenged with dioctyl phthalate (DOP). By measuring the upstream and downstream concentration, the filter efficiency can be calculated.

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

AAF DOP Test Facility.



AAF Laser Spectrometer.

CELL SIDE DESIGNS

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.

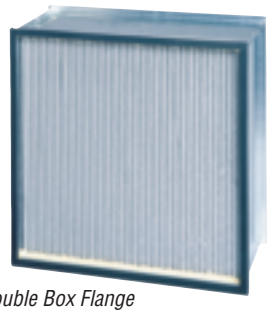
GASKETED FILTERS

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

Wood Construction

Particle Board

Metal Construction



Double Box Flange

Single Flat Flange

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.

Wood Construction

Plywood

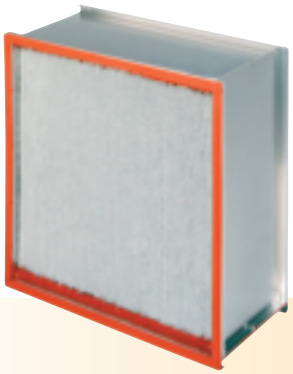
Metal Construction

Galvanized Steel

SPECIAL CONSTRUCTION ASTROCEL FILTERS

High Temperature Applications

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



HT 500 AstroCel

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

Military and Nuclear Designs

AstroCel filters are available to comply with military and nuclear specifications (MIL-F-51068) requiring special cell side material, radiation resistant media, rabbeted joints, special testing, and special packaging and marking.

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.

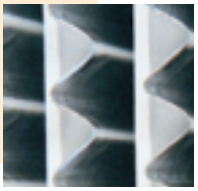
ASTROCEL I

Precision Engineered and Hand-crafted To Meet the Requirements of Critical Applications

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.

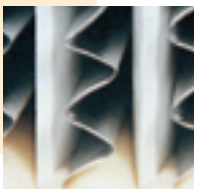
Rolled edge separators are used to minimize the risk of media damage.



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 foam bond, standard on most AstroCels, expands into the pack as it cures, eliminating voids.



Gaskets

Standard closed cell neoprene rubber gaskets to provide an airtight seal and prevent leakage past the filter. Gaskets are ¾" wide by ¼" thick. Silicone gaskets are also available.

Gel Seal

Gel seal filters contain AAF PermaGel™ silicone gel sealant.

Cell Sides

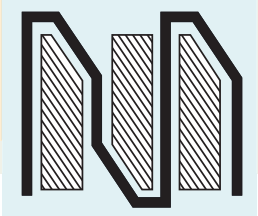
Wood – ¾" particle board is typically used. Butt joined edges are glued and stapled to assure a strong corner joint. Plywood is also available.

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

*Available with Intersept® treated media.

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.



Media

AstroCel 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 media is waterproof and fire retardant to 1000°F (538°C). A radiation resistant media is also available (for nuclear applications).

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

Minimum Efficiency

99.97% - .3µm (HEPA)

99.99% - .3µm (HEPA)

99.999% - .3µm (ULPA)

99.9995% - .10 to 20µm (ULPA)

Scan Tested (Optional)

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

Media

(Available with Intersept®)

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 Foam

White Polyurethane Elastomer

Silicone

Black Cement

Gasket

Neoprene Expanded Rubber

Silicone

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. (Limited to sizes no larger than 24" x 30".)

*Available with Intersept® treated media

ASTROCEL HCX

High Capacity

High Capacity AstroCel 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 velocities (up to 500 FPM, 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 Intersept® treated media***

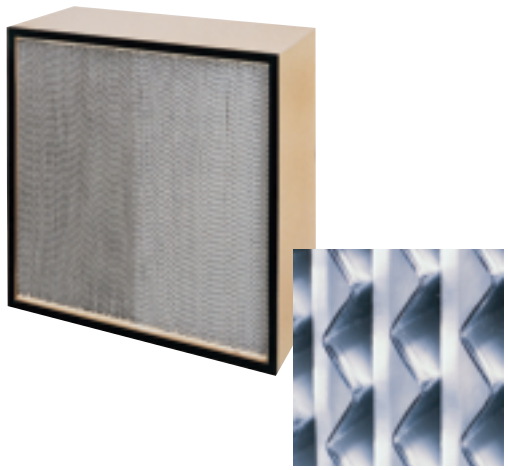
Sizes – All standard and special sizes, 11½" deep only.

Efficiencies – 99.97% and 99.99% minimum.

Cell Side Materials, Bonds, Separators, Gaskets – Same as standard AstroCel I filters.

AstroCel HCX filters are 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 permit more pleats resulting in more media area and increased airflow capacity.

SAVE ON NEW ASTROCEL HCX 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.

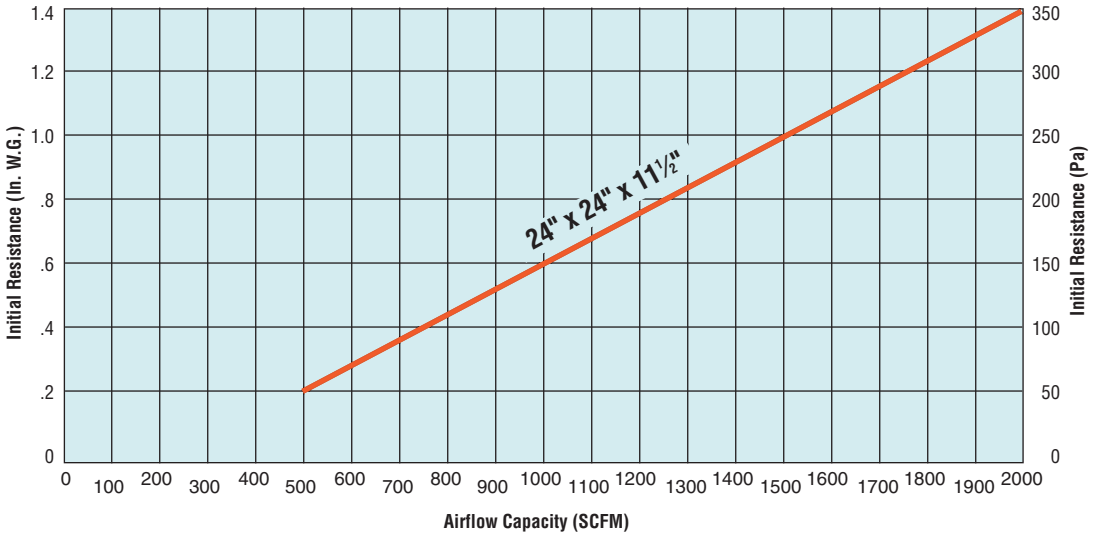
Less frequent change-out saves on labor and disposal costs.

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 HCX 24" x 24" x 11½"
Rated Airflow Capacity @ 1.4" W.G. (350 Pa) initial resistance	1450 CFM (2465 m^3/hr.)	2000 CFM (3400 m^3/hr.)
Rated Airflow Capacity @ 1.0" W.G. (250 Pa) initial resistance	1050 CFM (1785 m^3/hr.)	1500 CFM (2550 m^3/hr.)
Service Life Ratio @ 1000 CFM (1700 m^3/hr.)	1.0	2.0

HCX INITIAL RESISTANCE VS AIRFLOW CAPACITY



AstroCel 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.

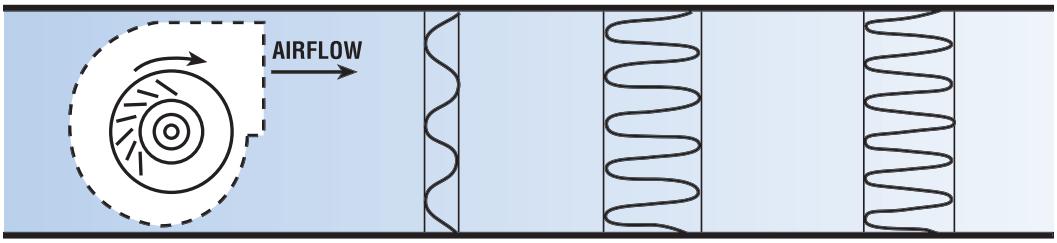
EXTEND ASTROCEL LIFE WITH PREFILTERS

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 filters. 90% ASHRAE filters can extend HEPA filter life nearly nine times.

Prefilter	Life Extension of AstroCel
2" Disposable Panel Filter	26%
Extended Surface Filters	
25% ASHRAE Efficiency	35%
60%	170%
80%	520%
90%	880%

TYPICAL THREE STAGE HEPA FILTER INSTALLATION



1st Stage	2nd Stage	Final Stage HEPA Filters
*AmAir Pleated Panel Filters (25-30%)	Select From: *VariCel® *VariCel II *VariCel II MH *VariCel-V (90-95%)	Select From: *AstroCel 1 *AstroCel HCX (99.97 - 99.9995%)

*Available with Intersept®

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