Why use an Airborne Molecular Contamination (AMC) filter?

As processes and line widths become finer the presence of even PPB level gas phase contaminates will damage processes. As processes become more demanding the use of AMC filtration will increase
How AMC filtration works

AMC filters remove gas phase contaminants by removing them as the air passes through the AMC media. Each AMC filter adsorbs the contaminants as a function of residence time, and so the manufacturer’s specified flux rate (flow per unit area of media) cannot be increased or both the removal efficiency and lifetime will be substantially decreased.
AMC filtration and FFUs

Let’s take a look
An FFU is designed to deliver a typical 90 FPM air flow at the 0.48” pressure drop of the PTFE particulate filter.
Tech note, affecting the following discussion

Due to the loss of effective filter area around the edges for the frame and the glue that holds the media in place, it takes roughly 100 FPM flow from the effective filter area to yield 90 FPM in the application (so the FFU is spec’d at 90 FPM which requires 100 FPM flow for both the PTFE particulate and AMC filters)
How much fan reserve is typically “built into” an FFU for filter loading and miscellaneous additional pressured drops in the system

A typical specification is for the FFU to be able to deliver 90 FPM with 20% fan reserve
When you add an AMC prefilter how much pressure drop do you add to the system?
Example 1, Camfil Gigapleat@ 0.25”
Example 2, Donaldson BSM Max @ 0.8"

Donaldson BSMmax
Airborne Molecular Contamination Filters

*Expected life is dependent upon actual fab conditions and based on systems results using Donaldson filters in a LITHOguard® -12 cabinet.

*Expected Life with BSMmax - Ammonia

System Results • System Results • System Results

Ammonia ppm

2600 m³/h

3 10 20 30 40

SO₂ ppm

2600 m³/h

3 10 20 30 40

*Expected Life with BSMmax - Sulfur Dioxide

System Results • System Results • System Results

2600 m³/h

3 10 20 30 40

*Expected Life with BSMmax - HMDSO

System Results • System Results • System Results

2600 m³/h

3 10 20 30 40

0.8" pressure drop at 100 FPM flow rate

BSMmax Filters | Part #510805 | Part #512612
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System | LITHOguard-12 | LITHOguard-12
Dimensions | 552mm x 185mm x 430mm | 552mm x 185mm x 430mm
Flow | 235scfm (433 m³/hr) | 255scfm (433 m³/hr)
Pressure Drop | **190 Pa (0.8" water gauge) | **255Pa (433 m³/hr)
Approximate Weight | **18 kg (40 lbs.) | **20.5 kg (45 lbs.)

*Results per filter

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What will the addition of an AMC filter do to the flow of my current FFU?

See the following slide for an example. The curve you see is for our most popular fan in our FFU series, the EBM RE220, 220 mm wheel backward curved airfoil.
Answer: it will knock the flow down by 30-70% from the typical 90 FPM spec, when we only have 20% reserve to work with.
The point?

An AMC FFU will have much larger fans, capable of overcoming the substantially higher total system pressure, and retrofitting AMC filters onto an existing FFU is not typically possible if you expect to have 90 FPM flow from the FFU.
An additional issue with retrofitting FFUs with an AMC filter

To stay within the typically specified 100 FPM flow rate of the AMC filter, the AMC filter surface area will need to roughly equal the surface area of the FFU.
Here’s an example of an AMC FFU; however, the most popular market priced FFUs are designed with a single fan.
And that single fan design limits the size of the AMC filter, forcing the flow rate through the AMC filter to be way to high.
Well designed AMC FFUs

Good practices and rules of thumb
The air mixing plenum

If the AMC filter sits too close to the fan inlet, air will be selectively pulled from the area directly above the fans, resulting in a shortened life of the AMC filter(s). AMC filter manufacturers typically recommend a 8” mixing plenum, but available area often dictates a much shorter plenum. We have built well performing FFUs with plenums as short as 3”
A full height air mixing plenum
Servicing the AMC filters

The following picture shows a FFU with handles on the AMC filters for easy removal. The AMC filter is basically a specialty prefilter, removed from the top, and so enough space must be available above the AMC filter to allow for it to be lifted up over the lips that it sits down in before being slid to the side and out of the way (this FFU also features integral ionization and the Simco-Ion Interface module is visible)
Note that the AMC filter’s surface area is equivalent to the PTFE filter to hold the 100 FPM AMC filter spec.
Have an application where you need an AMC FFU?

Let us know the current concentration of the species you wish to eliminate, and we will design an AMC filter/FFU combination, providing you with an FFU that can deliver your CFM specification, plus an expected lifetime/efficiency table, as shown on the next slide.
Filter Life Estimate for removal

50μg/m³, 25°C, 50%RH, 0.44 m³/sec

(standard 90 FPM)

AMC filter efficiency/lifetime curve

90%
We have the expertise and experience. Need a quote, or just have a question? Call us at (510) 656-5333 or e-mail to Jim@tesinc.com