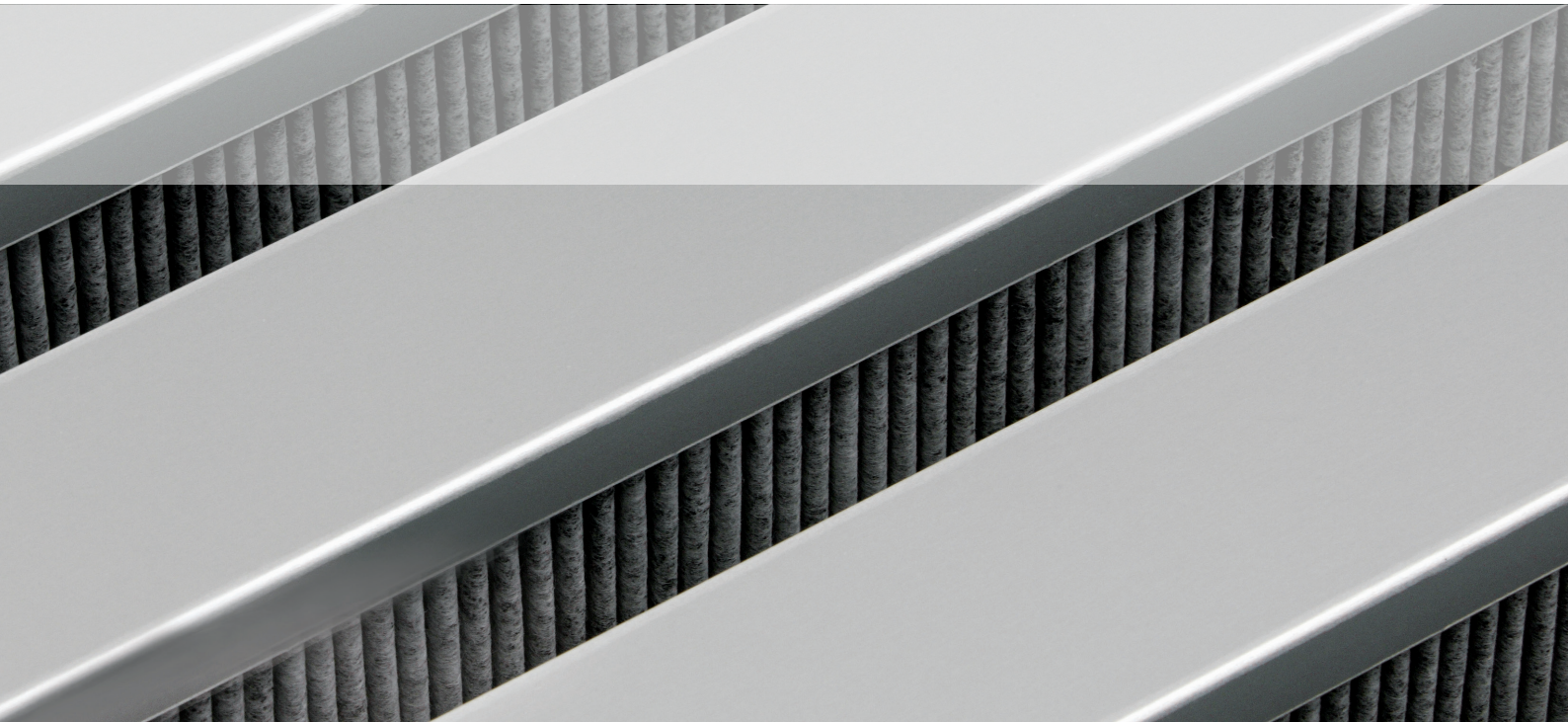




M+W GROUP



AMC Filter

Airborne Molecular Contamination Filter

Cleanroom Products



Absolute Concentration on the essential Element ...

... from the Pioneer of regenerative AMC Filters

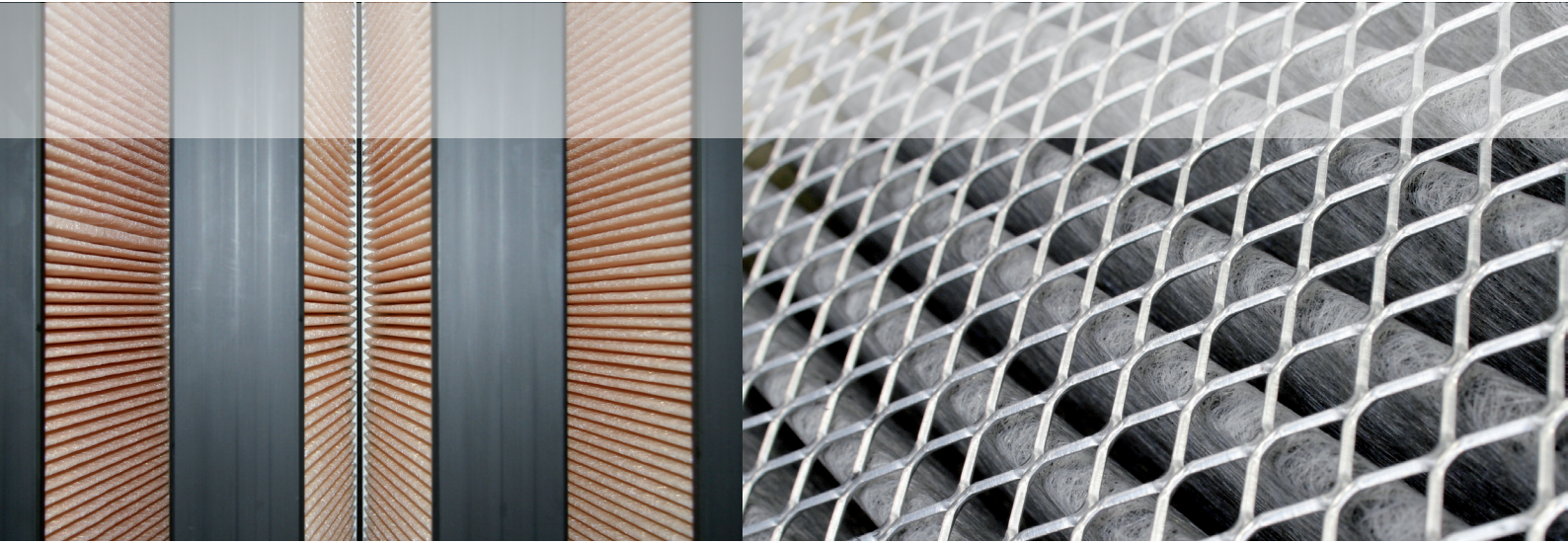
A special challenge of semiconductor manufacturing in small dimensions is airborne molecular contaminants, which can lead to undesired chemical reactions on the wafer surface and process equipment. The chemical reaction of acids, bases, organics and dopants existing in the process air, is called AMC (Airborne Molecular Contamination). Controlling this means an investment in AMC filters, with an unfortunately limited lifetime. Not only are highly efficient solutions needed, but also regenerative and cost-effective ones.

As one of the leading manufacturers M+W Products offers a variety of products and services in the field of AMC control. For the removal of gaseous contaminants different filter media are used: from activated carbon material to highly efficient fibrous ion exchange material especially developed for the semiconductor industry. In this field M+W Products has an outstanding position worldwide with unique fibrous ion exchange materials for removal of acidic as well as basic contaminants. All filters can be produced for the use in make-up and recirculation air systems (V-cell shape) as well as tool and process protection filters (flat shape).

Contrary to the HEPA filters, typically used in cleanrooms for particle removal, AMC filters have a limited lifespan and therefore have to be replaced by new filters after an operation period of one to three years. This fact leads to high cost of ownership as well as a considerably large amount of waste. Waste reduction was an essential criterion for the development of **regenerative filter products** based on activated carbon material as well as on ion exchangers. Being able to use the filters several times helps to reduce both waste and cost.

Highly efficient filter material for cost-effective
make-up air, return air and process air filtrations

Step by Step to a total Contamination Control Concept



First Step: Analysis

The first step towards a comprehensive Contamination Control Concept is a careful analysis of the AMC levels in the cleanroom as well as of the incoming air. M+W Products invests in state-of-the-art measurement technology, including ion chromatography (IC), thermal desorption gas chromatography combined with mass spectrometry (TD GC-MS), inductive coupled plasma mass spectrometry (ICP MS) and online monitoring systems.

Second Step: Concept

After determining the AMC levels, our experts will work together with your engineers to design a unified Contamination Control Concept that encompasses the outside air treatment, the cleanroom and the minienvironments. This includes the current status of AMC concentrations and the cost of ownership.

We will propose strategies on how to best reduce AMC concentrations in the production environment and minimize costs through advanced AMC control procedures.

Third Step: Choice

A key element behind M+W Products' success in the field of contamination control is that we fully understand the science of AMC control. We work closely with some of the top researchers and institutes. Furthermore, M+W Products engages top international suppliers only. This ensures a consistently high level of safety, quality and reliability.

Fourth Step: Realization

We are therefore able to identify which equipment is required and what needs to be built. This is evidenced by the fact that construction, once it begins, proceeds very swiftly. In no time the installation is up and running and performing to specification. That's because we methodically structure our installation schedule so that construction time can be kept to a minimum.

That also includes the selection of the most appropriate materials of construction, i.e. with low and/or short lasting outgassing properties based on an extensive data base and actual testing. We know better than anyone that stoppages to production cost money – every minute counts.

Fifth Step: Certification

Certification provides you with assurance that the installations will function as originally planned. Certification involves redeploying the advanced measuring techniques with which we began the Total Contamination Control Concept. This step closes the circle of an overall contamination control concept and also establishes the AMC baseline required for future troubleshooting activities.

Analysis

Concept

Choice

Realization

Certification



Acids	Bases
NO _x SO _x HCl HF H ₂ SO ₄	Amines Methylamine Triethylamine NH ₃ NMP
Condensables	Dopants
Toluol 2-Propanol Silicones Xylene Heptane Benzene Siloxanes BHT	AsH ₃ B ₂ H ₆ BF ₃ Organophosphates TEP TCP O=P
No classification H ₂ O ₂ Acetone O ₃ IPA H ₂ S	

Categories of AMC and typical Compounds

AMC is a collective term for molecules that react with wafer surfaces and the IC structures. In some cases, these molecules appear in the form of salt or metal particles, but primarily consist of gaseous substances.

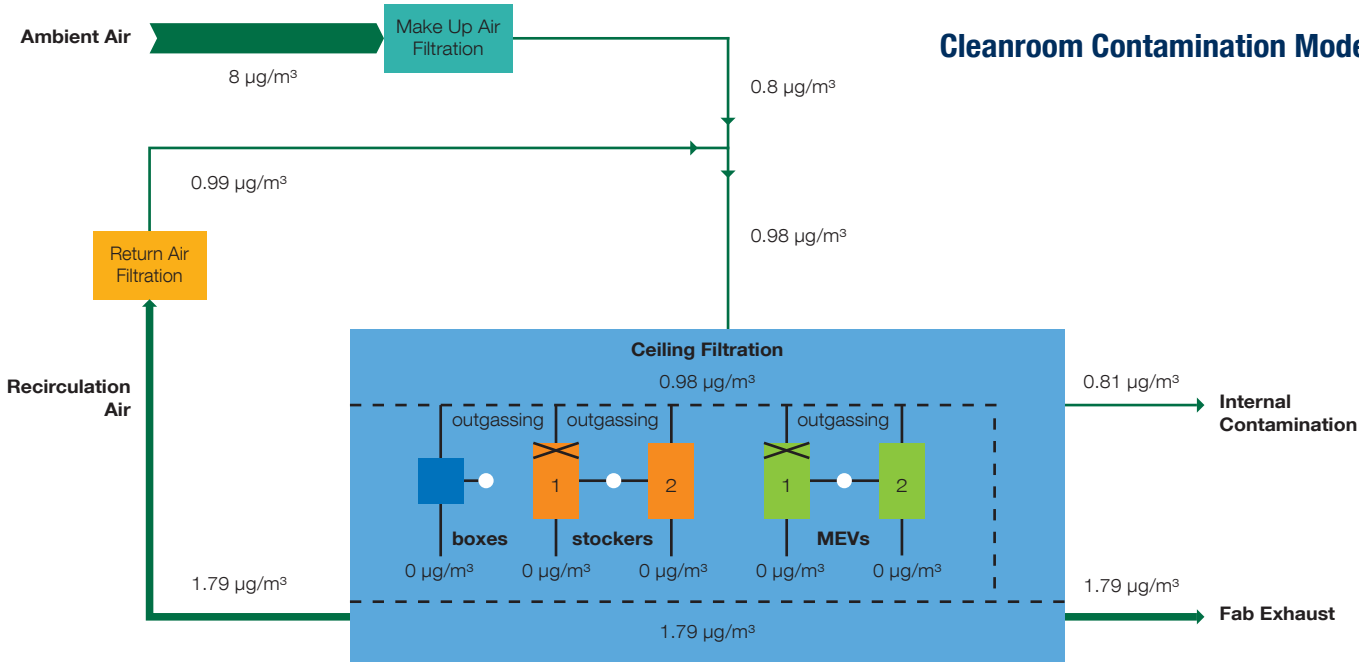
SEMI norm F 21 has classified these substances into four types:

- Acids
- Bases
- Condensables
- Dopants

Costs and Benefits

Our solutions are targeted to provide you the best cost of ownership. The good news is that, thanks to an upfront proposal, you know exactly what you will receive for your money. Furthermore, we will calculate the amortization period of your investment.

M+W Products utilizes a specialized software simulation tool to determine the most cost-effective solution from the beginning. We also share this tool with our clients to enable permanent monitoring of AMC levels in the fab and simulation of "What-if-...?" scenarios.

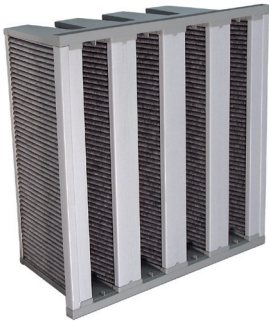


AMC Filter Product Line

Makeup- and Return Air

V-shape filter types

for application at air flow velocities >1.5 m/s



CCF-Series (Compact Carbon Filter)

with polystyrene frame containing activated or impregnated carbon media.

- CCF-CD with highly activated carbon for removal of condensables resp. VOC's (Volatile Organic Condensables)
- CCF-ACD and CCF-BCD series with impregnated carbon for removal of acids or bases as well as condensables / VOC's



C-IXL-Series

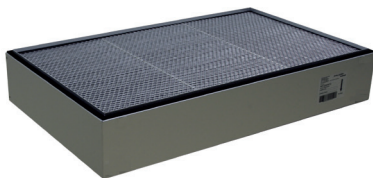
with metal frame and removable cover plate.

- Combination of all available AMC filter medias possible (e.g. C-IXL-CD, C-IXL-ACD)
- Low generation of waste material because of multiple usage of filter frames
- Configuration of filter media can be changed at all replacement cycles

Tool and Process Protection

Flat filter types for installation on top of ceiling or process tool FFU

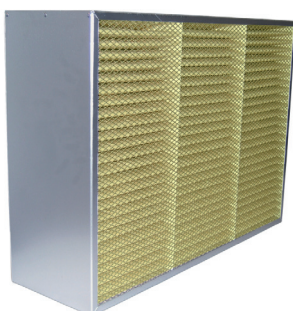
for application at air flow velocities <1.5 m/s



ICF- / PCF-Series

with metal frame containing activated or impregnated carbon media.

- PCF-CD with highly activated carbon for removal of condensables resp. VOC's
- CF-ACD and ICF-BCD series with impregnated carbon for removal of acids or bases as well as condensables / VOC's



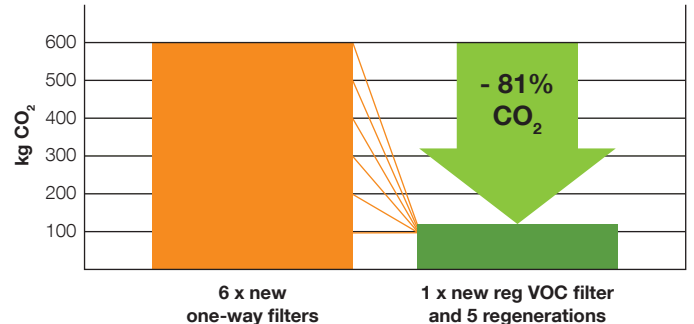
INX- / PCF-Series

with metal frame containing media combination for removal of all possible AMC's.

- This combination of ion exchange media with impregnated activated carbon material merges the best of all filter technologies
- Complete removal of all substances according to SEMI F21 (acids, bases, condensables, dopants) within one filter

Green Design Regenerative AMC Filters

Waste reduction was an essential criterion for the development of regenerative filter products based on activated carbon material as well as on ion exchangers. Being able to use the filters several times helps to reduce both waste and cost.



Carbon footprint can be reduced by more than 80 percent with our regenerative filters

Makeup- and Return Air (Regenerative)



R-IXV-Series

Regenerable ion exchange filter v-shape for selective and high performance removal of acids or bases.

- Excellent removal behaviour due to high speed ion exchange down to ppt-ranges
- Environmentally friendly product due to possibility to regenerate



Regeneration of ion exchange filters

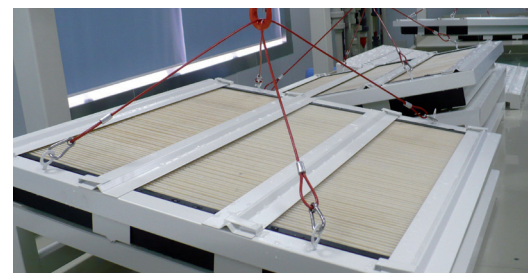
Tool and Process Protection (Regenerative)



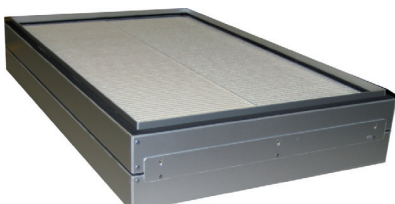
R-PCF-CD-Series

Regenerable carbon filter with metal frame and high capacity activated carbon material.

- Newly designed and unique activated carbon block structure
- Environmentally friendly product due to possibility to regenerate



Regeneration of ion exchange filters



R-INX-Series

Regenerable ion exchange filter flat version for selective and high performance removal of acids or bases.

- Excellent removal behaviour due to high speed ion exchange down to ppt-ranges
- Environmentally friendly product due to possibility to regenerate



Regeneration of activated carbon filters

M+W Products GmbH (Headquarters)

A Company of the M+W Group

Lotterbergstr. 30

70499 Stuttgart, Germany

Phone +49 711 8804-1742

Fax +49 711 8804-1668

products@mwgroup.net

www.mwgroup.net

M+W Products (Shanghai) Co., Ltd.

A Company of the M+W Group

No. 139 Beimin Road, Che dun, Songjiang Area

Shanghai, 201611, P.R. China

Phone +86 21 3783-8360

Fax +86 21 3783-7681

M+W U.S., Inc.

A Company of the M+W Group

4710 East Elwood, Suite #9

Phoenix, AZ 85040, USA

Phone +1 480 303-6600

Fax +1 480 303-9300