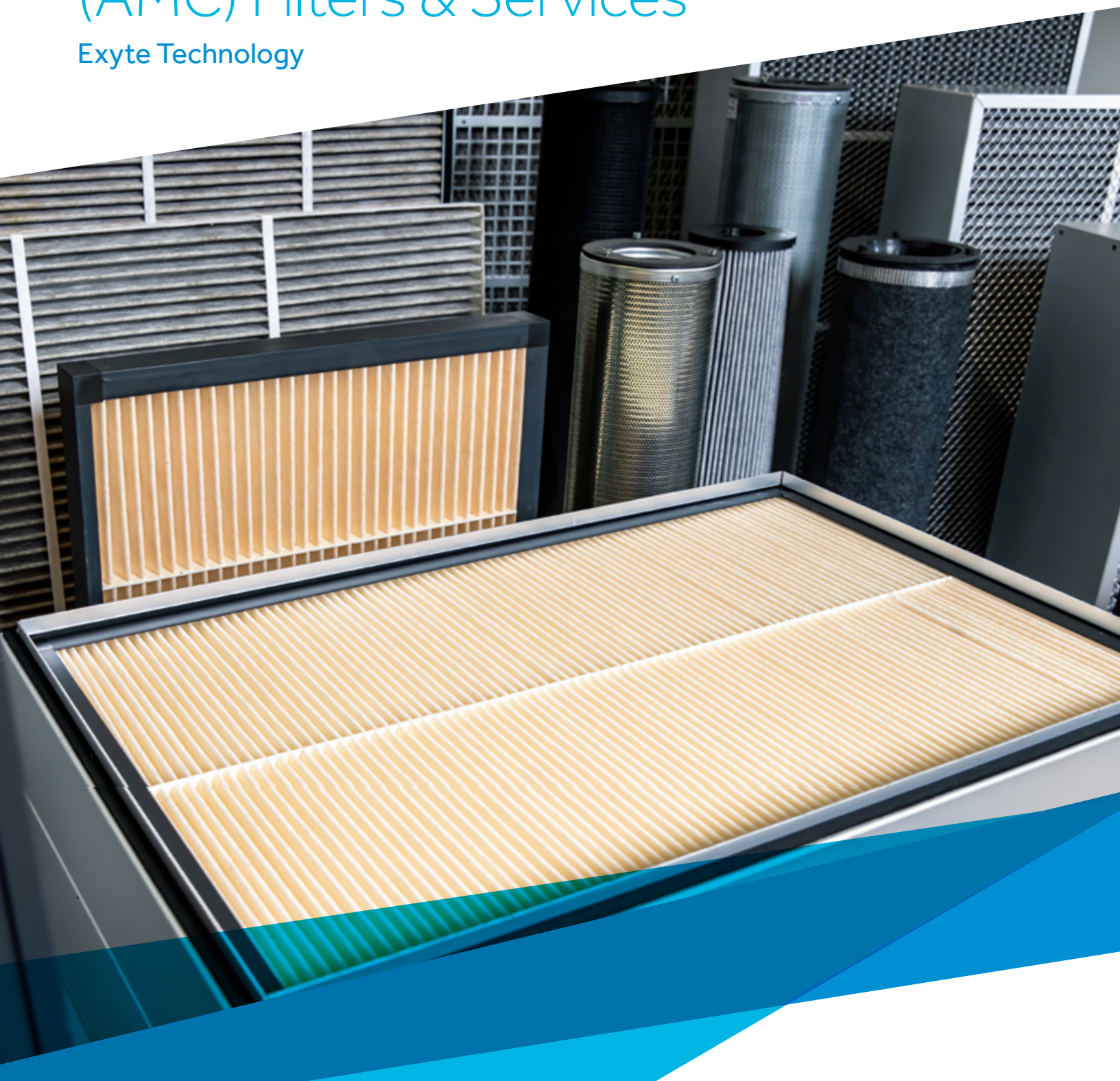
Airborne Molecular Contamination (AMC) Filters & Services

Exyte Technology



Classification of AMC's

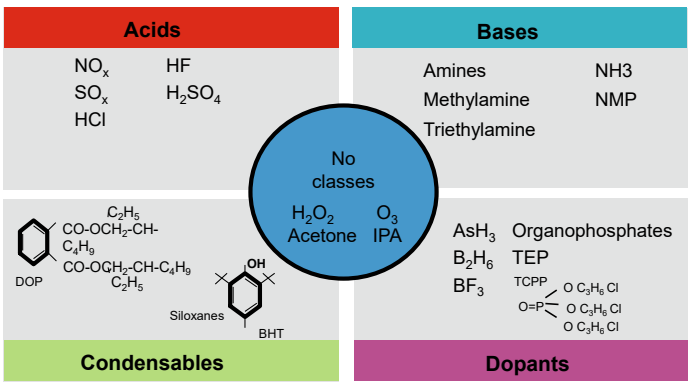
For cost-effective make-up air, return air and process air filtrations

Introduction

Besides particle removal, a special challenge in controlling the air quality for semiconductor manufacturing and other sensitive industries lies in the control of AMC's (Airborne Molecular Contamination). Here, the task is to remove chemical molecules and substances from air, which are known to cause delirious effects to the wafer surface, optics, processes or process equipment.
Being part of the Exyte Group, the leading construction company for semiconductor fabs, Exyte Technology pioneered the field of AMC control with over 20 years of experience. Exyte Technology offers a comprehensive variety of different filtration products for various application areas, such as make-up air (MAU) or return air filters filters for cleanroom ceilings or for tool and process protection.

Classification of AMC's

AMC compounds are typically classified in acids, bases, condensables (organic compounds with a molar weight of 120 g/mol and a boiling point of >150°C) and dopants (chemicals which can change the electrical properties of semiconductor wafers), according to SEMI standard F-021.



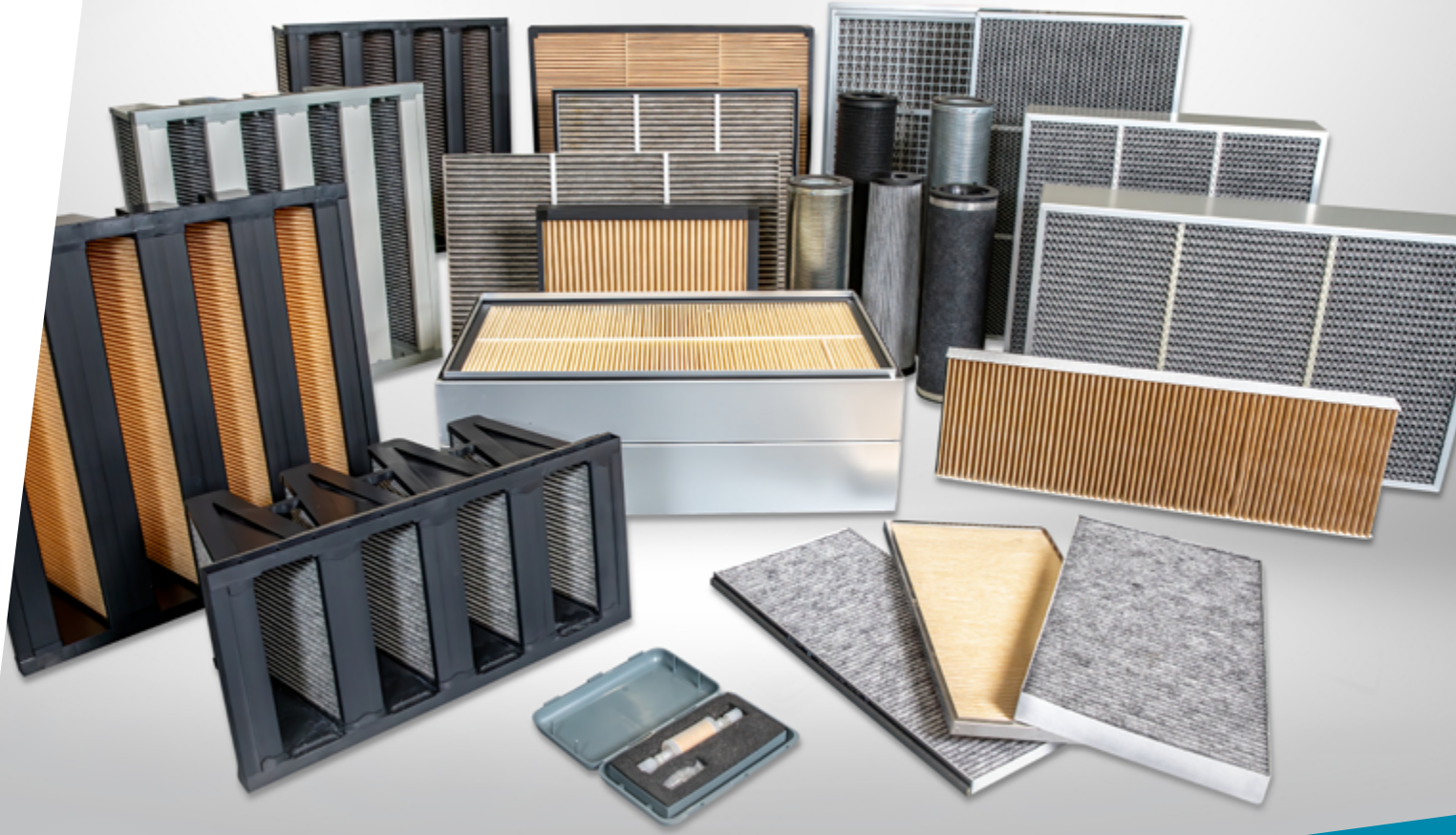
Besides those, there are also other substances, which are known to cause delirious effects, i.e. other corrosive species such as H_2O_2, H_2S or ozone. With ever shrinking device geometries of semiconductor chips, even low boiling VOC's (volatile organic compounds) nowadays turn out to become a problem, which were still rated as uncritical at higher process-nodes. Exyte can consult you and deliver the most technical sound and economical solution for your process needs – step-by-step.

The products are engineered in our in-house technology center and are qualified and optimized in all relevant aspects such as filter capacity (= max lifetime), highest removal efficiency (= max process protection), lowest pressure drop (= energy saving), lowest outgassing and particle development. This is accompanied by complementary services such as application consulting, on-site measurements, rest capacity analyses, etc.

We look forward helping you finding the right solution for your special requirements!

AMC Filter product range

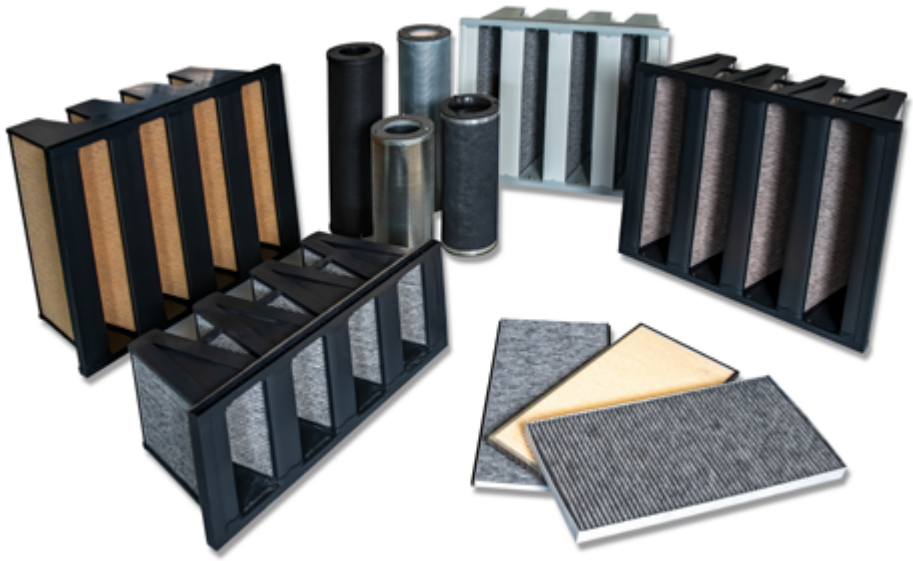
The right solution for your special requirements!



AMC Filter Product Line

Makeup - and Return Air

Different filtration systems for treatment of high air velocities of >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

IXV-Series (Ion-eXchange-V-shape)

with polystyrene frame containing various granular of fibrous ion-exchange media

- IXV-A with anion-exchange medium for removal of acids
- IXV-B with cation-exchange medium for removal of bases

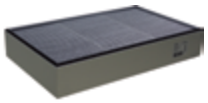
C-IXL-Series

with metal frame and removable cover plate.

- Combination of all available AMC filter medias possible
- Low generation of waste material because of multiple usage of filter frames
- Configuration of filter media can be changed at all replacement cycles

FFU or usage on process tools

Different filtration systems for treatment of air 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
- ICF-ACD and ICF-BCD series with impregnated carbon for removal of acids or bases as well as condensables / VOC's

INX-Series (IoN-eXchange)

with metal frame containing various granular or fibrous ion-exchange media.

- INX-A with anion-exchange medium for removal of acids
- INX-B with cation-exchange medium for removal of bases

Modular – stackable filter design

Filters out of the ICF/PCF series and the INX series can be offered with modular filter frames, which can be stacked on top of each other without additional assembly aids. This allows the exchange of separate filter layers, once they are expended.

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

Step by step to a Total Contamination Control Concept

Step 1: Analysis

The first step towards a comprehensive Contamination Control Concept is a careful analysis of the prevailing AMC levels in the cleanroom, as well as the incoming air.
With our in-house analytical lab, we are able to offer state-of-the-art analytical services, including ion-chromatography (IC), thermal desorption gas chromatography combined with mass spectrometry (TD GS-MS), as well as various online measurement systems.

Step 2: Concept

After determining the AMC levels, our experts will work together with your engineers to discuss the results and develop a Contamination Control Concept, that encompasses outside air treatment, the cleanroom and the machine/mini-environment level.

Step 3: Choice

A key element of Exyte Technology's success in the field of contamination control is that we fully understand the science of AMC control. In our in-house technology center, we continuously research and develop for the most efficient filter media, as well as optimizing our filters in all relevant regards such as:

- Highest removal efficiency (= highest protection level)
- Very high filter capacity (= longest useful filter life)
- Lowest pressure drop (= energy savings = lowest cost-of-ownership)
- Lowest outgassing behavior
- Minimized particle shedding

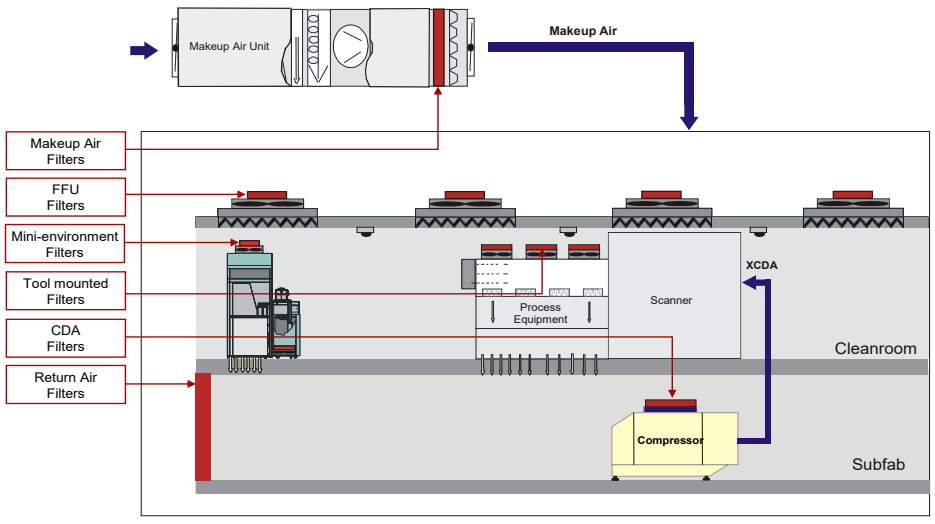
Depending on the filtration goal to be achieved, we can therefore choose from a broad variety of suitable filter media, which ensures a consistently high level of safety, quality and reliability.

Step 4: Control and refinement

After the installation, the actual achieved AMC levels have to be measured with the same measurement techniques we started with. From then on, the values in the cleanroom should be measured and observed in regular intervals. This step closes the circle of the Total Contamination Control Concept and acts as basis for the planning of future filter exchange cycles, as well as to periodically re-think and refine the filtration concept for continuous improvement and cost-optimization.

Treatment of AMC's

After having identified the types of AMC's and their source, the cleanroom concept needs to be reviewed and the best location for filter installation decided on. The following graph shows the potential areas for installation of chemical filters:



Chemical Filter Testing

Chemical Filter Technology

Chemical filters are used in a wide variety of applications for the contamination control of ambient and circulating air. Monitoring and filtration are usually done in the ppb range. The AMC Team of Exyte Technology offers comprehensive service for testing new as well as proofing of chemical filter materials that have to meet the highest quality requirements. The development of filter materials is focused on removal of all kinds of acidic, basic and organic substances.

Our AMC Team is equipped with several test rigs and air handling units with precise air conditioning for filter tests:

- Dosage of various test substances for simulating relevant cleanroom contaminations (e.g. SO_2, H_2S, NH_3, TMB, ozone and others) can be realized
- Testing of several filter materials: modified activated carbon, ion exchange raisins, modified inorganic adsorbent materials and others
- Online measurement devices as well as offline sampling (impinger method and adsorbent tubes) are available

The filter testing program provides results about:

- Advanced sampling procedure to handle higher pressure and flow
- Determination of removal efficiency
- Filter capacity
- Remaining life time test after a time period of using within its life time cycle
- Outgassing behavior of filter materials and components
- Pressure drop measurement

Gas Mixing Panel

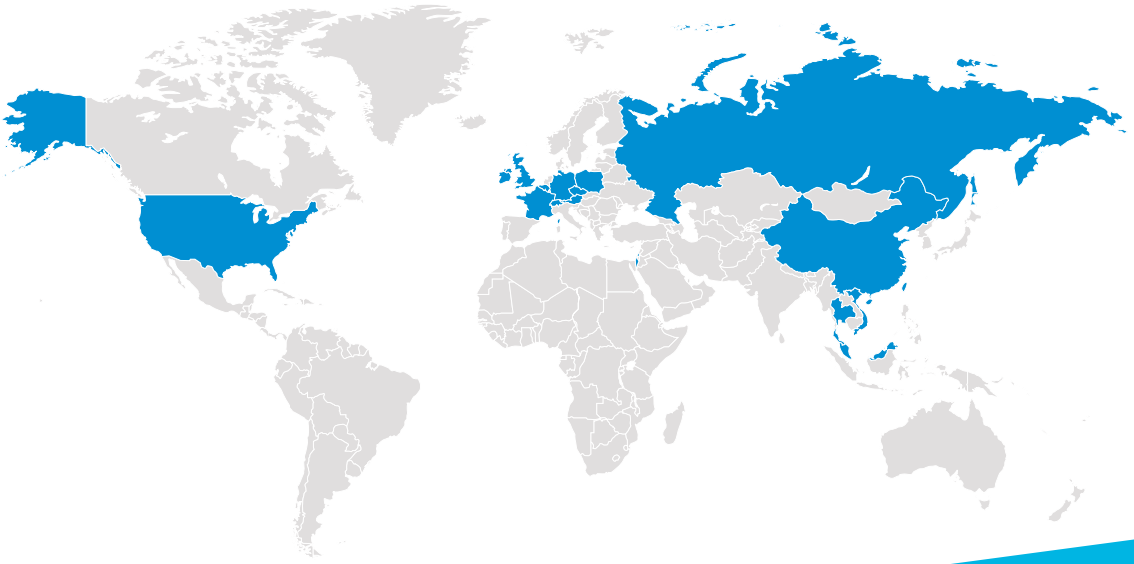
Media Test Unit

Filter Test Units

Solvent Vaporizer

Pressure Drop Measurement

Local Support
Wherever You Need Us



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