

Analytical Services Standard/Non- Compliance Testing

Support your cleanroom operation with analytical expertise

Entegris Analytical Services is the leader in the measurement of airborne molecular contamination (AMC) for semiconductor environments and processes, photolithography applications, and OEM compliance.

Based on more than 30 years of service and chemical filter development, Analytical Services is one of more than 30 Global Entegris Labs and provides state-of-the-art AMC analysis for a variety of applications to ensure confident operation of photolithography and other high-technology cleanroom environments.

APPLICATIONS

Following the “See It. Control It.” paradigm, Entegris Analytical Services naturally complements our market-leading chemical filtration and purification systems and a broad suite of products for comprehensive contamination control solutions. The service provides measurements for tool validation, contamination events, troubleshooting, materials outgassing, product validation, and other cleanroom applications.



FEATURES & BENEFITS

OEM approved service	Data support discussions with tool OEMs on environment AMC, filter lifetime, tool operation and lens warranty
Fastest AMC sampling service	In and out of the cleanroom within one work shift Most AMC classes sampled in four hours at the low ppt level
ISO/IEC 17025 accredited services—a competence standard for testing laboratories	Confidence in data and detection limits <ul style="list-style-type: none">On-site sample operators trained and certified for sampling — no customer involvement necessaryDetection limits are statistically evaluated at 99% confidenceInter-laboratory comparisons and traceable standards ensure highest accuracy
AMC filter and applications expertise	Service complements a comprehensive suite of Entegris contamination control solutions and enables development of customized products Technical discussion and consultation enables most effective contamination control solutions



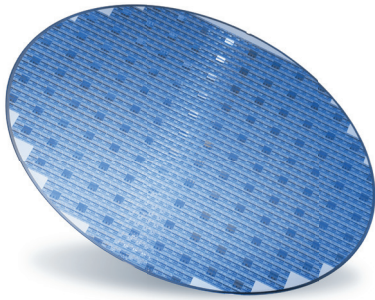
SPECIFICATIONS

AMC CLASS	ANALYTES	SAMPLE TRAPS	ANALYTICAL METHOD
Acids/anions	Fluoride (F ⁻), chloride (Cl ⁻), bromide (Br ⁻), nitrate (NO ₃ ⁻), nitrite (NO ₂ ⁻), sulfate (SO ₄ ²⁻), sulfite (SO ₃ ²⁻), phosphate (PO ₄ ³⁻), acetate (CH ₃ COO ⁻), formate (HCOO ⁻)	DI water impingers or dry adsorbent traps	Ion chromatography (IC)
Bases/cations	Ammonium (NH ₄ ⁺ , NH ₃), amines (R ₃ -N); Na ⁺ , K ⁺ , Li ⁺ , Ca ²⁺ , Mg ²⁺ provided on request	DI water impingers or dry adsorbent traps	Ion chromatography (IC)
Organics and refractory compounds¹	Volatile and condensible organic compounds from IPA to C26, except volatile silicon containing compounds.	TruTOC™ Entegris traps	Gas chromatography/ mass spectrometry with automated thermal desorption (GC/MS-ATD)
LMW silicon	Low molecular weight silicon compounds: TMS, HMDSO, D3	Entegris proprietary traps	GCMS/liquid micro-extraction (LME)

Physical Specifications

Sample time	4 – 6 hours, plus 30 minutes each for setup and break-down Supply gas testing requires 24 hours of purging of sample port and line prior to sampling
Equipment	Battery-operated, customized equipment Materials with proprietary manufacturing, cleaning and coatings
Reporting limits	For acids and bases, see separate list; DLs are typically less than 0.1 ppb For organic compounds: 10 ppt

¹Refractory compounds are organic compounds with atoms other than C, H, N, and O. For example, those containing silicon, sulfur, halogens, or metals.



Detection limits

Peak-to-noise ratios are not suitable to determine detection limits for chromatographic measurements. Entegris Analytical Services employs statistical methods with 99% confidence to determine detection limits (similar to SEMI® C10-0299). Analytical Services distinguishes between three types of limits:

- Instrument Detection Limit (IDL) is the minimum concentration that can be statistically distinguished from zero.
- Method Detection Limit (MDL) is the minimum concentration that can be distinguished from the IDL and the minimum that should be reported. It is usually ~2X IDL.
- Reporting Limit (RL) is an artificial limit usually defined by compliance requirements, such as those of scanner/stepper manufacturers. Ideally, the RL should not be lower than the MDL.

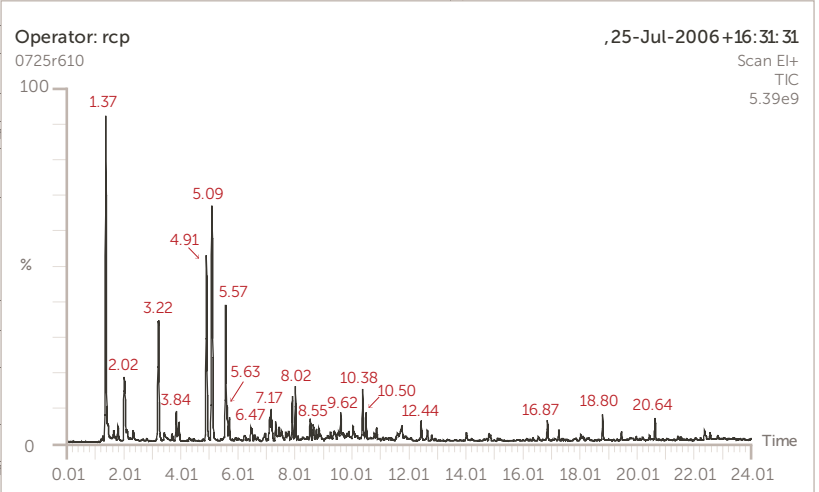
ANALYTICAL DATA REPORT

Summary Table – ppbV:

Sample Location	Total acids	Total bases	Total HMW organics (as toluene)	Total LMW organics (as toluene)	Total LMW Silicon	Total Moisture (H ₂ O)
Cabinet, Inlet. Note: E1250, S/N 1234.	0.5					
Outgasing: Materials evaluation, system component	< 0.1					
Control Blank	< 0.1					
Any difference between total bases and ammonium is due to the presence of						

Summary Table – µg/m³:

Sample Location	Total acids
Cabinet, Inlet. Note: E1250, S/N 1234.	1.0
Outgasing: Materials evaluation, system component	< RL
Control Blank	< RL
Any difference between total bases and ammonium is due to the presence of	



ORDERING INFORMATION

Noncompliance services

Part number	Service	Comments
ESI005404-01	AMC report, acids, bases, HMW organics	See analytes list
ESI005404-03	AMC report, acids only	See analytes list
ESI005404-04	AMC report, bases only	See analytes list
ESI005404-06	AMC Report, HMW organics (speciated and TOC)	2,2,5-TMH and up
ESI005404-11	AMC report, acids and bases	See analytes list
ESI005404-14	AMC Report, LMW silicon	TMS, HMDSO, D3
ESI005404-15	AMC report, HMW organics and LMW silicon	2,2,5-TMH and up, TMS, HMDSO and D3
ESI005404-16	AMC report, acids, bases, HMW organics, LMW silicon	See analytes list
ESI005404-17	AMC report, acids, bases, LMW and HMW organics	See analytes list
ESI005404-18	AMC report, acids, bases, LMW and HMW organics, LMW silicon	See analytes list
ESI005404-20	AMC report LMW and HMW organics IPA to C26	
ESI005491-01	Specialty services, as per custom quote	Consult sales

Did you know?

- Entegris provides annual measurement programs, automatically scheduled as required.
- Even though many labs use Tenax GR, Analytical Services does not recommend using Tenax GR for LMW organic and refractory AMC. Tenax GR does not capture LMW organics quantitatively and does not provide repeatable recovery for TMS. Underestimation of AMC by as much as 100X may result.
- A combination of carbon-containing traps and thermal desorption does not work for the analysis of TMS, see Lobert et al., [Proc. of SPIE, Vol. 7272, 727222-1, 2009](#).

FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit entegris.com and select the [Contact Us](#) link to find the customer service center nearest you.

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