

MS Certified Vials

Pre-cleaned and certified vials
for mass spectrometry



MS Certified Vials

The FIRST and ONLY pre-cleaned, low particle, low background chromatography vial

When your instrumentation, sample handling and methodology is pushing the limits, a chromatography vial that can keep up is essential.

Low Particle Background

The presence of inorganic sub micron particles in all glass vials as a byproduct of the manufacturing process is a little known phenomenon that has not been extensively studied. Gas chromatographers depend on injection port liners to act as traps for particulates while the HPLC chromatographer takes extensive steps to eliminate them during sample preparation. This has been an effective strategy for routine analytical methods, but the need to work with ever lower concentrations of analytes creates the possibility of interactions with compounds of interest.

Thermo Scientific™ Mass Spec (MS) Certified Vials undergo a proprietary cleaning process that greatly reduces the background particulates along with their potential affect on high sensitivity chromatography.

The table below gives a comparison of the particle distribution obtained from an analysis of standard vials versus the Thermo Scientific MS Certified Vials. All MS Certified Vials are processed and tested for background particulates. A typical vial that has not

- The only chromatography vials pre-cleaned to provide unmatched consistency
- The first low particle, low background chromatography vials
- Pre-cleaned vial packaging protects the product integrity
- High purity closures packed in air-tight re-closeable container
- Tested and certified for up to 15 critical physical characteristics affecting vial performance
- Tested and certified for low background by positive ESI LC/MS
- Tested and certified for low background by GC/MS

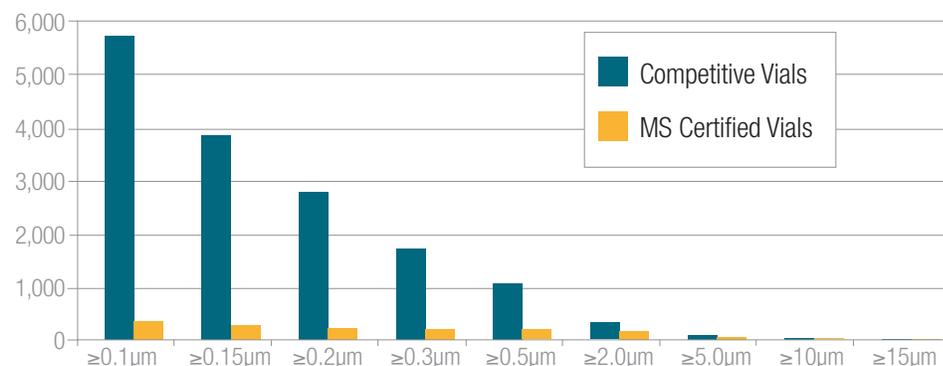
been processed can exhibit particle counts exceeding 5000 particles per mL with the highest counts occurring in the range below 0.5µm. This has traditionally been of little concern when GC inlet liners or HPLC guard columns are used. GC techniques employing on-column injection create the need for a sample vial with minimal background particulates to prevent an accumulation of foreign material at the head of the column than might adversely affect a separation. Similarly newer techniques employing finely packed HPLC columns, capillary

columns and direct connection of the analytical column to the sample valve also require the elimination of as much particulate matter as possible from the sample stream.

The table below shows the results obtained from particulate analysis of a typical unprocessed vial compared to the Thermo Scientific MS Certified Vials. The processed vial shows a significant reduction in total particle counts.

VIAL	≥0.1µm	≥0.15µm	≥0.2µm	≥0.2µm	≥0.5µm	≥2.0µm	≥5.0µm	≥10µm	≥15µm
Competitive Vials	5,677	3,809	2,755	1,709	1,051	307	76	4	0
Thermo Scientific Vials	356	264	218	192	176	160	45	8	3

Typical Cumulative Particle Counts



Low LC/MS Background

Samples of MS Certified Vials and closures were exposed to acetonitrile at room temperature for two hours. Potential non-volatile organic compounds were determined using LC/UV and LC/MS with several ionization techniques: positive electro-spray, negative electrospray and positive atmospheric pressure ionization (APCI).

Additional testing was conducted on samples exposed to acetonitrile for two hours at a temperature of 50° C to determine the effect of severe operating conditions.

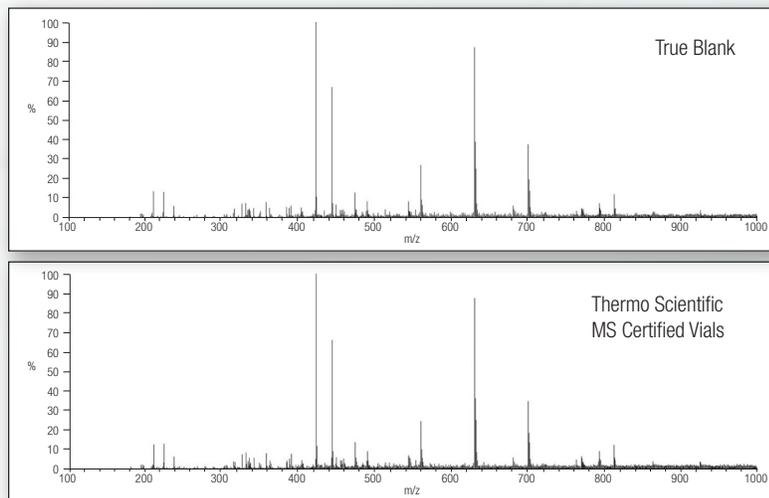
The results of the room temperature and 50° C were essentially the same indicating that the background contribution from the processed vials is minimal over a wide range of conditions. Typical background scans for the room temperature exposure are shown in the following figures.

The top scan in each figure is the result of injecting the pure blank extracting solvent without exposure to glassware other than the original reagent container and a pre-extracted sample vial.

The second scan for each figure represents an injection of an equal quantity of the extracting solvent after exposure to the pre-cleaned sample vial.

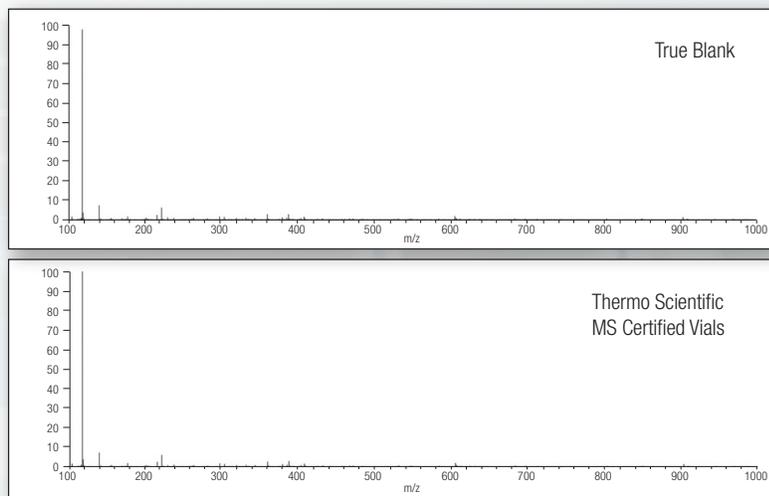
Instrument: Thermo Scientific™ Ultimate 3000 UHPLC with TSQ Quantiva
Column: Thermo Scientific™ Hypersil GOLD 3µm, 50 × 2.1mm
Mobile phase: A – H₂O + 0.1% formic acid;
B – MeOH + 0.1% formic acid (10-100% B 20 min)
Flow rate: 0.3mL/min
Temperature: 40° C
Injection vol.: 10µL
MS detection: Positive EI; Full scan 100 to 1000m/z

LC/MS Background Scan (Positive ESI)



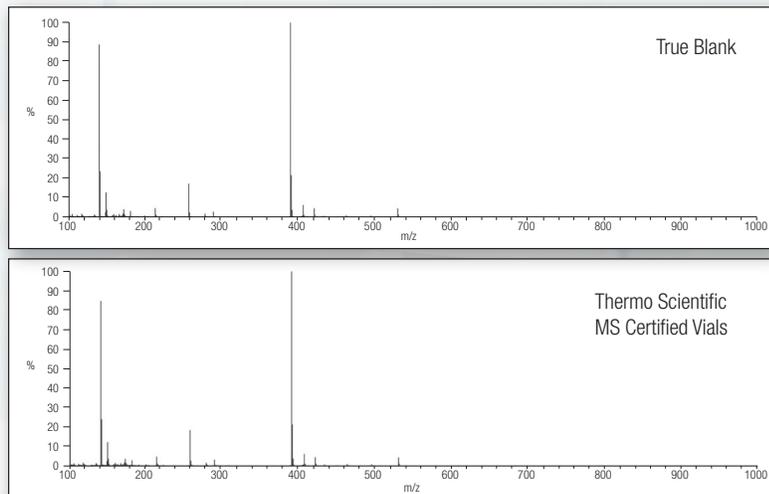
Conditions:
RT: 0.01-25.01
AV: 1211
NL: 2.31E4
T: +c ESI Full MS
[100.00-1000.00]

LC/MS Background Scan (Negative ESI)



Conditions:
RT: 0.01-25.00
AV: 1155
NL: 4.45E6
T: c ESI Full MS
[50.00-1500.00]

LC/MS Background Scan (APCI)



Conditions:
RT: 0.00-25.01
AV: 1209
NL: 6.79E7
T: +c APCI Full MS
[50.00-1500.00]

Comparison of the scans shows that the pre-cleaned MS Certified Vial does not contribute to the detectable background even at very high instrument sensitivity settings.

Low GC/MS Background

A portion of the vial extracts prepared for LC/MS analysis were taken for analysis by GC/MS. As with the LC/MS evaluation the vials were exposed at room temperature and 50° C. There was no significant difference between the room temperature and elevated temperature test results. A typical GC/MS scan is shown in the figure below with blank solvent in the upper scan and the vial extract shown in the lower scan.

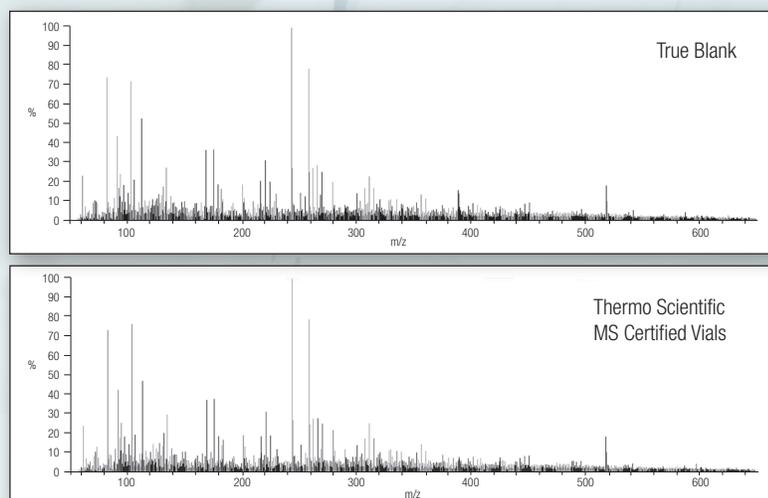
Monitoring of the TIC chromatogram between 10 and 20 minutes has been used to determine if any volatile organic species are present after the cleaning process.

Instrument: Thermo Scientific™ TRACE™ 1310, Thermo Scientific™ ISQ™ GC-MS and TriPlus RSH™ Autosampler
Column: Thermo Scientific™ TraceGOLD™ TG-5MS, 30m × 0.25mm × 0.25µm
Carrier gas: Helium
Flow rate: 1.2mL/min
Oven program: 40° C, hold for 0.5 min; 15° C/min to 150° C, hold for 1 min; 10° C /min to 290° C, hold for 5 min
Inlet temperature: 250° C; split flow: 50mL/min
Injection vol.: 1µL splitless
MS detection: Positive EI; Full scan 50 to 650nm

Each batch of vials and caps is tested using these conditions against a blank sample GC-MS background Scan GC-MS total ion current (TIC).

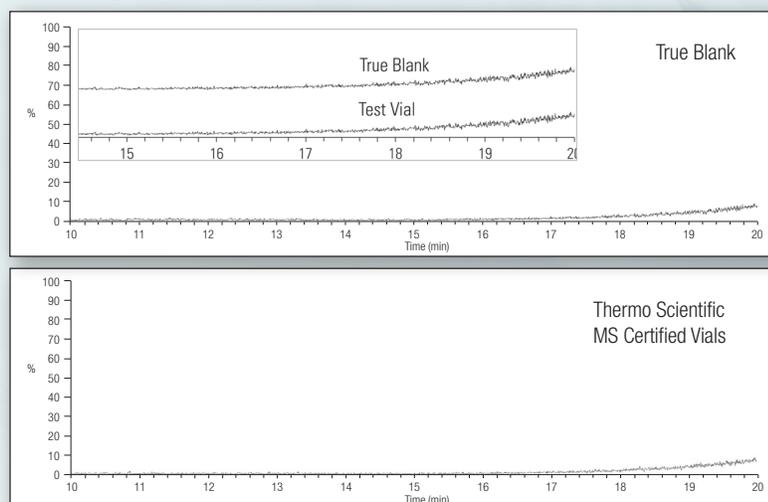


GC/MS Background Scan (Positive EI)



Conditions:
 RT: 0.01-25.00
 AV: 1167
 NL: 1.50E5
 T: +c Full MS
 [50.00-1500.00]

GC/MS Background Chromatogram



Conditions:
 RT: 10.0-20.00
 NL: 1.00E7
 TIC MS

Bonded, ultra-pure closures LC/MS and GC/MS



Manufacturing the Ultimate Vial for Mass Spectrometry

More than a quarter century of expertise goes into the production of every Thermo Scientific™ MS Certified Vial. It starts with production of the highest quality glass tubing selected for chemical stability, inertness, clarity and purity. MS Certified Vials are formed under the strictest automated manufacturing and quality control systems to produce a physically uniform product that has the longest record of continuous performance in the industry. Our MS Certified Vials are manufactured to the same high quality standards including in-process verification of up to 15 physical characteristics that are critical to reproducible performance.

Chromatographers have always depended on high temperature glass forming methods to burn off organic

contaminants in a vial that might be detected by instrumentation. Residual compounds that might survive the glass forming process were either not detected by traditional chromatography techniques or were present in concentrations too low to affect separation and analysis. Recent advances in instrument sensitivity and separation techniques have resulted in the detection of low level contaminants that may have previously gone undetected.

MS Certified Vials undergo additional processing to remove residual artifacts that may not be removed during

standard manufacturing processes. The vials are cleaned by our proprietary processing methods in a GMP compliant fully validated clean room environment. Each production lot is tested for particle counts,

LC/MS, GC/MS and particulate background to meet the quality control criteria plan designed to assure consistently superior performance from every vial.

After completing the MS Certified vial cleaning protocol, the vials are immediately packed into our pre-cleaned, inert vial trays in a Class 10 Cleanroom, over 1000 times cleaner than routinely used for glass or plastic packaging.

MS Certified Vial Closures

The caps have been selected on the basis of both septa cleanliness and the secure bonding of the pure clean silicone/PTFE into the caps. The caps are packaged in a re-sealable plastic container to further protect from contamination.

Unassembled and Assembled Vial Kits

Kit Type	Glass	Patched	Cap Color	Septum	Cat. No.	Pack of
Convenience Kit, 9mm SureStop Screw Vial, 2mL with AVCS Closure	Clear	Yes	Blue	Blue Silicone/PTFE	MSCERT5000-34W	100
	Amber	Yes	Blue	Blue Silicone/PTFE	MSCERT5000-35W	100
	Clear	Yes	Blue	Blue Silicone/PTFE, Pre-slit	MSCERT5000-40W	100
	Amber	Yes	Blue	Blue Silicone/PTFE, Pre-slit	MSCERT5000-41W	100
Convenience Kit, 9mm 200µL Fused Insert Screw Vial	Clear	Yes	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-30LWW	100
Convenience Kit, 9mm 350µL Fused Insert Screw Vial	Clear	Yes	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-31LWW	100
Convenience Kit, 9mm Wide Opening 1.7mL High Recovery Screw Vial with 30µL Reservoir	Clear	No	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-32	100
Convenience Kit, 9mm Wide Opening 1.5mL Total Recovery Screw Vial with 10µL Reservoir	Clear	No	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-33TR	100
Convenience Kit, 9mm Wide Opening Screw Vial, 2mL	Clear	Yes	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-341W	100
	Amber	Yes	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-351W	100
Convenience Kit, 9mm 200µL Fused Insert Screw Vial	Clear	Yes	Grey	Bonded Clear PTFE/Clear Silicone, Pre-slit	MSCERT5000-36LWW	100
Convenience Kit, 9mm 350µL Fused Insert Screw Vial	Clear	Yes	Grey	Bonded Clear PTFE/Clear Silicone, Pre-slit	MSCERT5000-37LWW	100
Convenience Kit, 9mm Wide Opening 1.7 mL High Recovery Screw Vial with 30µL Reservoir	Clear	No	Grey	Bonded Clear PTFE/Clear Silicone, Pre-slit	MSCERT5000-38	100
Convenience Kit, 9mm Wide Opening 1.5mL Total Recovery Screw Vial with 10µL Reservoir	Clear	No	Grey	Bonded Clear PTFE/Clear Silicone, Pre-slit	MSCERT5000-39TR	100
Convenience Kit, 9mm Wide Opening Screw Vial, 2mL	Clear	Yes	Grey	Bonded Clear PTFE/Clear Silicone, Pre-slit	MSCERT5000-401W	100
	Amber	Yes	Grey	Bonded Clear PTFE/Clear Silicone, Pre-slit	MSCERT5000-411W	100
Convenience Kit, 9mm Wide Opening Screw Vial, 2mL, silanized	Clear	Yes	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-S34W	100
	Amber	Yes	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-S35W	100
	Clear	Yes	Grey	Bonded Clear PTFE/Clear Silicone, Pre-slit	MSCERT5000-S40W	100
	Amber	Yes	Grey	Bonded Clear PTFE/Clear Silicone, Pre-slit	MSCERT5000-S41W	100
Convenience Kit, 11mm Snap Top Vial, 2mL	Clear	Yes	Red	Clear PTFE/Clear Silicone, Pre-slit	MSCERT4011-74W	100
Assembled Kit, 9mm Wide Opening Screw Vial, 2mL	Clear	Yes	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-134W	100
	Amber	Yes	Blue	Bonded Clear PTFE/Clear Silicone	MSCERT5000-135W	100
Assembled Kit, 13-425 Screw Vial, 4mL	Clear	Yes	Black	Bonded Clear PTFE/Clear Silicone	MSCERT4015-135W	100
	Amber	Yes	Black	Bonded Clear PTFE/Clear Silicone	MSCERT4015-136W	100

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