



MS Certified Vials

Pre-cleaned and certified vials
for mass spectrometry



The end of **mass-speculation**

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 controls systems to produce a physically uniform product that has the longest record of continuous performance in the industry. Thermo Scientific 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.

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.

- 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

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 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.

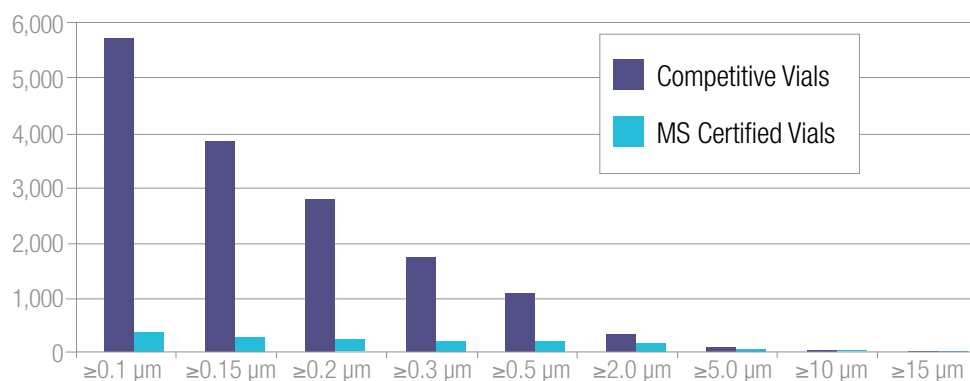
A typical vial that has not been processed can exhibit particle counts exceeding 5000 particles per mL with the highest counts occurring in the range below 0.5 μm . This has traditionally been of little concern when GC inlet liners or HPLC guard columns are used. GC techniques employing on-column injection 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	$\geq 0.1 \mu\text{m}$	$\geq 0.15 \mu\text{m}$	$\geq 0.2 \mu\text{m}$	$\geq 0.2 \mu\text{m}$	$\geq 0.5 \mu\text{m}$	$\geq 2.0 \mu\text{m}$	$\geq 5.0 \mu\text{m}$	$\geq 10 \mu\text{m}$	$\geq 15 \mu\text{m}$
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 2 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 2 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.

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.

Instrument: Thermo Scientific™ Accela 1250 UHPLC with LCQ Deca XP MS

Column: Thermo Scientific™ Hypersil GOLD 3 µm, 50 x 2.1 mm

Mobile phase: A – H₂O + 0.1% formic acid;
B – MeOH + 0.1% formic acid (10-100% B 20 min)

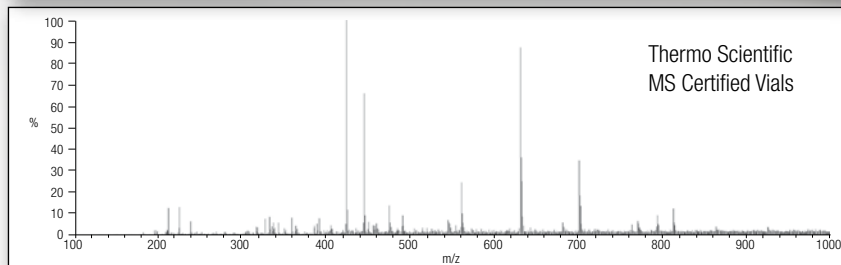
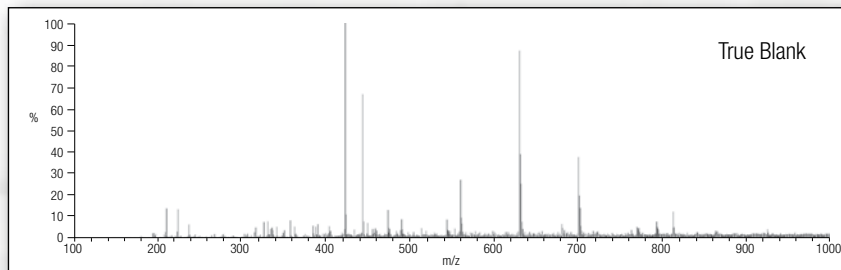
Flow rate: 0.3 mL/min

Temperature: 40 °C

Injection vol.: 10 µL

MS detection: Positive EI; Full scan 50 to 650 m/z

LC/MS Background Scan (Positive ESI)



Conditions:

RT: 0.01-25.01

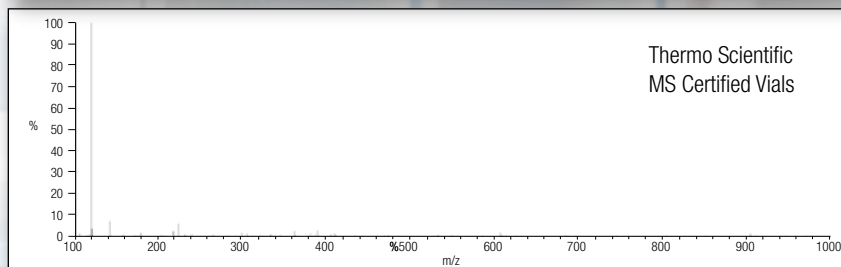
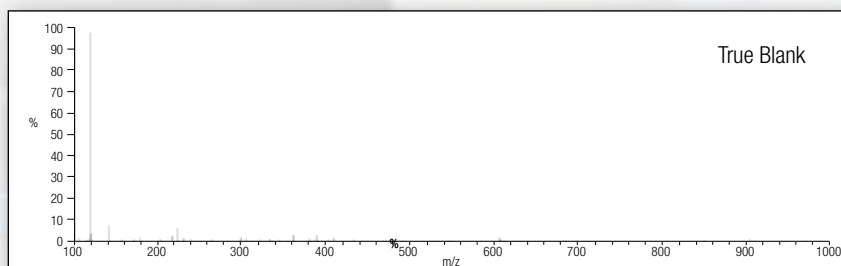
AV: 1211

NL: 2.31E4

T: +c ESI Full MS

[100.00-1000.00]

LC/MS Background Scan (Negative ESI)



Conditions:

RT: 0.01-25.00

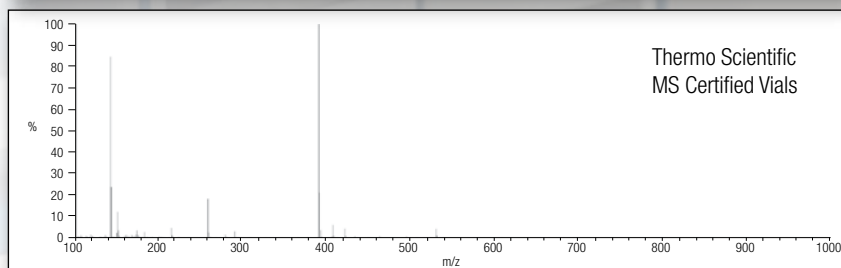
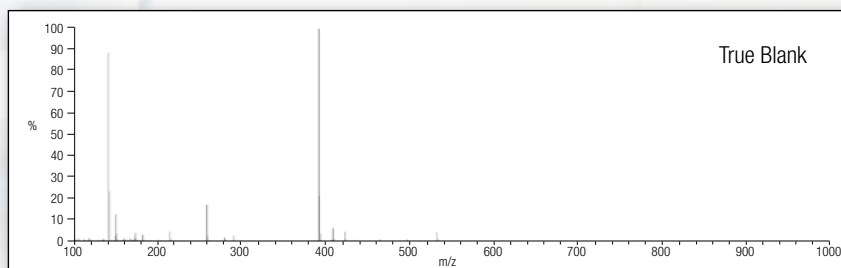
AV: 1155

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]

Low GC/MS Background

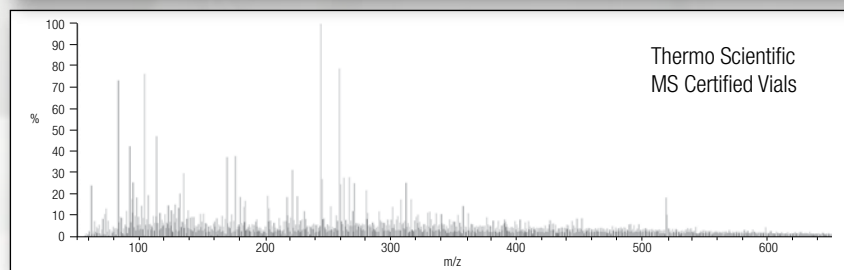
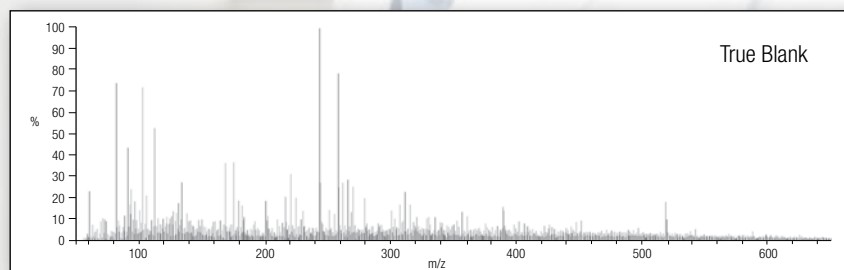
A portion of the vial extracts prepared for LC/MS analysis were taken for analysis by GC/MS. As with the LC/MS evaluation the vials were exposed at room temperature and 50 °C. There was no significant difference between the room temperature and elevated temperature test results. A typical GC/MS scan 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 ISQ™ GC-MS and TriPlus™ RSH Autosampler
Column: Thermo Scientific™ TraceGOLD™ TG-5MS, 30 m x 0.25 mm x 0.25 µm
Carrier gas: Helium
Flow rate: 1.2 mL/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: 50 mL/min
Injection vol.: 1 µL splitless
MS detection: Positive EI; Full scan 50 to 650 nm

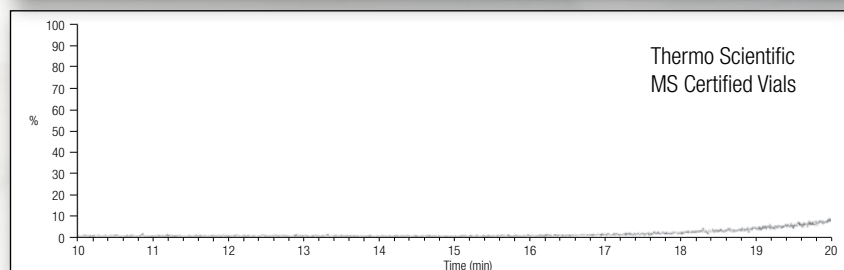
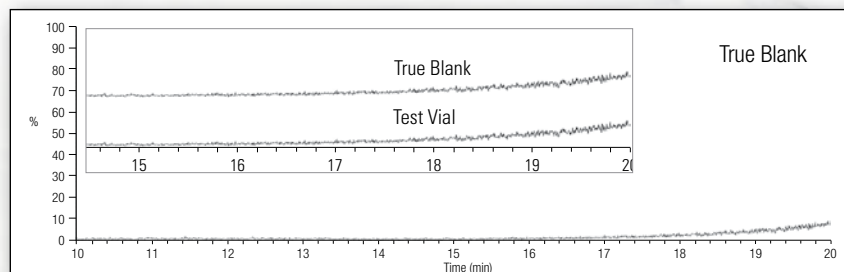
Each batch of vials and caps is tested using these conditions against a blank sample
GC-MS background Scan
GC-MS TIC

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

Thermo Scientific MS Certified Vials Ordering Information (all packs of 100)

Description (9mm Wide Opening Screw Thread Vials)	Blue Cap/PTFE Silicone Septa	Grey Cap/PTFE Silicone Septa, Pre-slit
200 µL clear ID fused insert 9 mm screw vial	MSCERT4000-30LW	MSCERT4000-36LW
350 µL clear ID fused insert 9 mm screw vial	MSCERT4000-31LW	MSCERT4000-37LW
1.5 mL clear high recovery 9 mm screw vial	MSCERT4000-32	MSCERT4000-38
1 mL clear total recovery 9 mm screw vial	MSCERT4000-33TR	MSCERT4000-39TR
2 mL clear ID 9 mm screw vial	MSCERT4000-34W	MSCERT4000-40W
2 mL amber ID 9 mm screw vial	MSCERT4000-35W	MSCERT4000-41W
Silanized 2 mL Clear ID 9 mm screw Vial	MSCERT4000-S34W	MSCERT4000-S40W
Silanized 2 mL Amber ID 9 mm screw Vial	MSCERT4000-S35W	MSCERT4000-S41W

Description - 11 mm Snap Top Vials	Part Number
2mL clear ID Vial, Black Cap, Clear PTFE Silicone Septa	MSCERT4011-73W
2mL clear ID Vial Red Cap, Clear PTFE/Clear Silicone Septa, Pre-slit	MSCERT4011-74W

Description - Assembled Kits	Part Number
Assembled Kit, 13-425 Screw 4 mL clear ID Vial, Black Cap, Bonded Clear PTFE/Clear Silicone Septa	MSCERT4015-135W
Assembled Kit, 13-425 Screw 4 mL amber ID Vial, Black Cap, Bonded Clear PTFE/Clear Silicone Septa	MSCERT4015-136W
Assembled Kit, 9 mm Wide Opening Screw Vial, 2 mL clear ID vial	MSCERT4000-134W
Assembled Kit, 9 mm Wide Opening Screw Vial, 2 mL amber ID vial	MSCERT4000-135W

Discover the most comprehensive array of Thermo Scientific™ sample handling solutions available



SureStop™ 9 mm Vials

- Consistent sealing
- Optimal seal regardless of torque
- Advanced Vial Closure System (AVCS) design improves autosampler compatibility



Thermo Scientific 9 mm Closures for 12 x 32 mm Vials

- AVCS technology design
- Eliminates septa push through
- Improved sealing, less evaporation
- Unlimited septa/closure flexibility
- Lower operational costs



Total Recovery Vials

- 1.5 mL sample volume
- Large flat support base gives vial stability
- Precise tapered internal design provides maximum recovery with residual volume < 1 µL
- Available as 9 mm screw thread or 11 mm crimp/snap

www.thermoscientific.com/vials for more information.